...TME

# THE PAPER INDUSTRY and PAPER WORLD

...N EDUCATIONAL NEWS MAGAZINE—DECEMBER, 1947

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DETROIT

YEAR-'ROUND

*Reliability*

*FOR THE MOST EXACTING*

*PAPERMILL DEMANDS!*

**PATTERSON**

***SATISFACTORY***

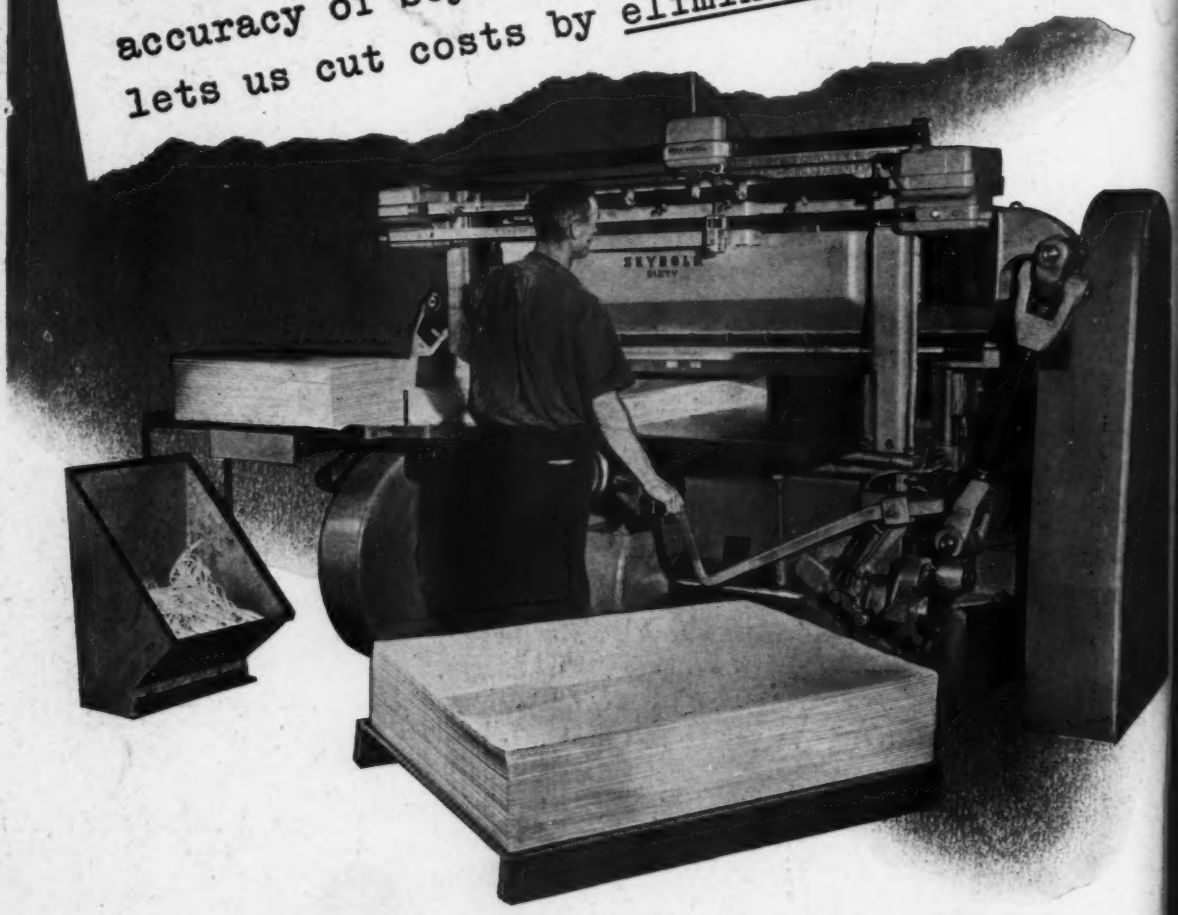
**MACHINERY**

Papermill service is tough, but Patterson Equipment is tougher! We build for dependable performance.

Richard L. Conway

**The Patterson Foundry and Machine Co.**
East Liverpool, Ohio, U. S. A.
**The Patterson Foundry and Machine Co., (Canada) Ltd.**
Toronto, Canada

**BADGER PAPER MILLS, INC. REPORTS:** "The extreme accuracy of Seybold 'Sixty' Spacer Trimmers lets us cut costs by eliminating retrimming."



"A demonstration convinced us that the Seybold 'Sixty' Spacer-Trimmer should fit in perfectly with our plans to reduce production costs. Even so, after giving our first 'Sixty' a chance to prove itself in actual production, we weren't quite prepared for the good news our production records revealed.

"Since it has been installed, we have found that retrimming is no longer necessary. Careful inspection disclosed that when cutting 8½" x 11" sheets to size, all piles were very uniform in size and were squared up as well, or better, than was formerly accomplished by retrimming.

"Furthermore, the 'Sixty' does its work so efficiently and easily that it has made a big hit with our operators."

Very frequently, important cost savings are introduced into paper mill operations as a result of an analysis of paper cutting procedure by a Harris-Seybold representative. His recommendations are based upon many years of close association with, and a thorough study of, paper mill production. Why not put *your* problem up to him? Write.

**Harris-Seybold Company • Cleveland 5, Ohio**

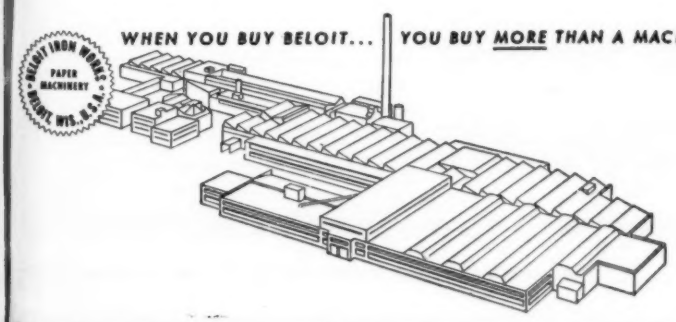
***YOU TOO CAN CUT CUTTING COSTS WI***

**SEYBOLD "*Sixty*" MILL SPACER TRIMMERS**

Mo
par
hig
lem

## Co-ordination conference

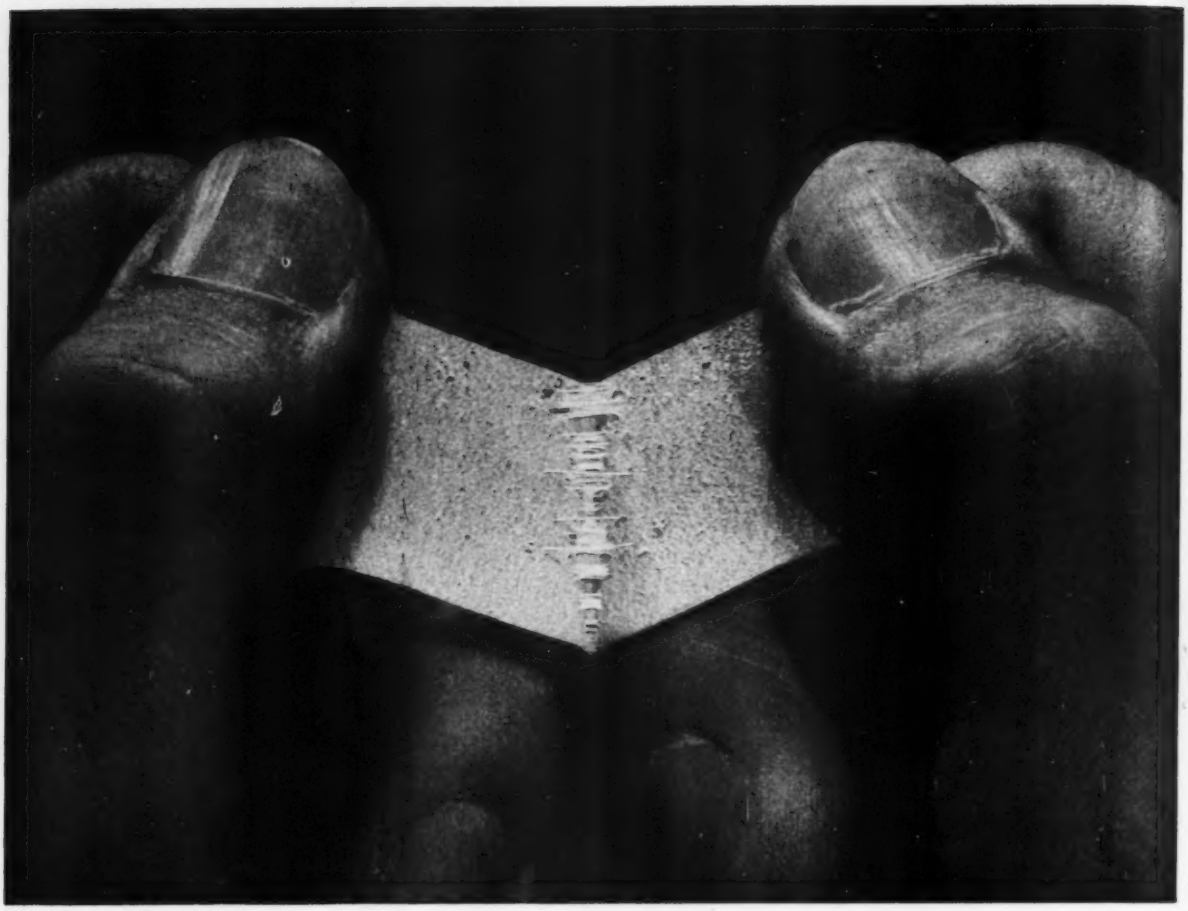
More than a hundred tools and over half a million parts are involved in putting a single Beloit post-war high-speed machine through the shop. Elmer Macklem (*left*), representing Sales, and Bill Wood, Works Manager, frequently confer on the tremendous job of co-ordination—keeping all tools busy around the clock, and making sure that the right parts are ready when required. *Beloit Iron Works, Beloit, Wisconsin.*




WHEN YOU BUY BELOIT... YOU BUY MORE THAN A MACHINE!

**BELOIT**

**PAPER MACHINERY**



# IMPROVED ADHESION

## Monsanto Toluene Sulfonamid-Type Plasticizers and Resins

If you are looking for plasticizers to increase the adhesion of your coating or to make adhesives of the solvent or heat-sealing type, you should consider Monsanto's sulfonamide plasticizers and resins. They offer improved adhesion in combination with a large variety of resins. In addition, they give excellent plasticizing value.

One of the unique properties of these sulfonamids is their compatibility with thermo-setting resins. In addition, they are compatible with proteins such as casein, zein, soybean protein, hide and bone glue — synthetic rubbers such as butadiene and acrylo nitrile — cellulose derivatives, polyvinyl acetate and polyamids.

While some Monsanto plasticizers are not yet commercially plentiful, others are becoming more available. In any case, it is quite possible that Monsanto can offer valuable suggestions on different phases of your present or contemplated plasticizer and resin applications. Contact the nearest Monsanto Office, or address Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, 1701 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cincinnati, Charlotte, Cleveland, Birmingham, Houston, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Limited, Montreal.

MONSANTO
CHEMICALS AND PLASTICS

**SEND FOR MONSANTO'S BOOKLET "PLASTICIZERS AND RESINS"**

This booklet will give you complete specifications and application data on Monsanto's broad line of plasticizers and resins. Samples of those applicable to your needs will be gladly sent on request.

SERVING INDUSTRY . . . WHICH SERVES MANKIND

# How Reliance V★S can help *you*

# meet the greatest challenge

# industry has ever faced

**WAGES** go up and up, along with materials and other manufacturing costs. But to keep America prosperous, prices cannot be permitted to spiral to the point where large numbers of consumers are forced out of the market. How to prevent this presents the greatest challenge industry has ever faced.

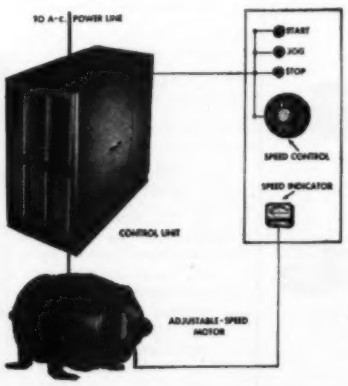
One sound answer is increased production through the use of more efficient machinery and methods. And this is where Reliance V★S can help you. *We have yet to find the industry where the V★S Drive cannot improve the quantity and quality of output, while lowering costs.*

A Reliance Application Engineer will survey your operations, then show you where and how you can benefit most through use of V★S—*the All-electric, Adjustable-speed Drive, operating from A-c. Circuits.* Just phone the nearest Reliance representative or write us direct for Bulletin 311.

**RELIANCE ELECTRIC & ENGINEERING CO.**
**1078 IVANHOE ROAD • CLEVELAND 10, OHIO**
*Sales Representatives in Principal Cities*

RELIANCE V★S DRIVE

*Available in the Electronic System (1 to 5 hp.), in the Rotating System (1 to 200 hp.), or in a combination of both systems.*



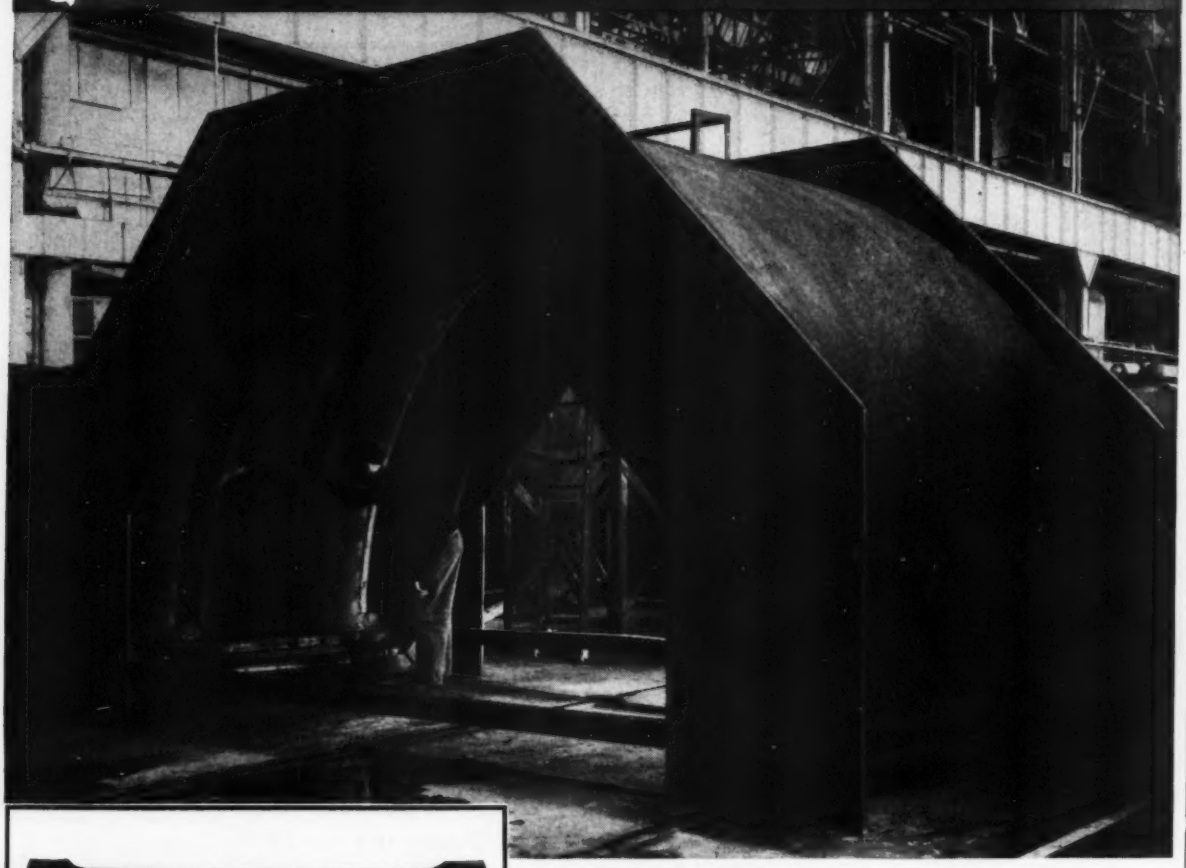

*Reliance V★S Drive provides unlimited flexibility of machine operation. Starting, stopping, speed changing, reversing, maintenance of proper tension and other functions are exercised automatically or manually from nearby or remote stations.*

**RELIANCE A-C D-C MOTORS**

"MOTOR DRIVE IS MORE THAN POWER"

# NEWS

A. O. SMITH Corporation



**CORSETS FOR VESSELS:** This unique SMITHway fixture serves an extremely important purpose. It prevents warpage of large diameter sections during assembly of detail.

*Tensile test showing ductility of stainless steel weld metal "as welded."*

*Tensile test showing embrittlement of stainless steel weld metal after stress-annealing at 1600° F.*

*Tensile test showing ductility of stainless steel weld metal, made with SMITHway controlled electrodes, after stress-annealing at 1600° F.*

**DUCTILITY DOUBLED!** Certain stainless steels could not be welded and then stress-annealed because the weld deposits became too brittle. Then A. O. Smith Research developed a new balance between electrode coating and weld metal which increased the weld ductility to within limits required.

**56,290,043 SPOT WELDS!**

In the eleven years that Charles Bublitz has been operating the semi-automatic spot welding machine, it has made 56,290,043 spot welds in 889,258 sq. ft. of stainless steel SMITHlining for vessels in corrosive service.

# THE PAPER INDUSTRY and PAPER WORLD

(Reg. U. S. Pat. Off.)

VOLUME 29 - - - - DECEMBER, 1947 - - - - NUMBER 9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# THE *BEATING* DOESN'T END AT THE BEATERS

**Mill superintendents** often say: "You can't beat Hamilton Felts."

**As a matter of fact** . . . you *can* beat them. Hour after hour . . . day after day, week in and week out, Hamilton Felts get a terrific beating from the whippers, the suction boxes and the press. The important thing is that Hamilton Felts can take it.

**The strength** of the wool fibers used in spinning the yarns for Hamilton Felts . . . the special techniques employed in weaving them . . . the skill developed by ninety years of experience . . . the knowledge of the peculiar requirements of every type of machine for manufacturing paper or board . . . all these add up to longer life for Hamilton Felts and lower costs for the mills that use them.

• From the thinnest tissue to the heaviest board, there is a Hamilton Felt that will do your work better, faster and at lower cost.

**SHULER & BENNINGHOFEN, HAMILTON, OHIO**

• Miami Woolen Mills •

**Hamilton Felts**

• Established 1858 •

ROLL IT?...

FOLD IT?...

WET IT?...

**IF YOUR PAPER MUST DO THIS...STAND UP... PRINT EFFICIENTLY**

USE

# ALWAX SIZES

ESPECIALLY at this time of year, when indoor humidities are low, paper tends to lose its pliability... to crack and break due to loss in moisture content. How can you minimize this tendency . . . help your paper retain its superior folding, creasing, scoring and crimping qualities?

ALWAX** Sizes are the standard and *economical* answer: *as little as one to two tenths of one per cent does the job.* And there are ALWAX Sizes to meet practically any need, ranging from papers for fine envelopes to paperboard stocks for heavy cartons.

ALWAX Sizes improve, too, such characteristics as resistance to penetration by printing and writing inks, and the tendency of such inks to spread. Also improved are water resistance, water shedding, and penetration by many organic liquids. Here, again, small quantities of ALWAX Sizes do the job for you efficiently and economically.

Either as material or as end products, you'll find that your paper or paperboard handles, sells, and does its work better when treated with ALWAX Sizes. Cyanamid will gladly work with you in the proper application of ALWAX Sizes to *your* particular paper and methods of operation. We'll be glad, too, to show you how Cyanamid's extensive roster of high-quality paper chemicals can help you solve many problems of paper or packaging.

***WHEN PERFORMANCE COUNTS... CALL ON CYANAMID***

*Industrial Chemicals Division*

**AMERICAN CYANAMID COMPANY**

**30 ROCKEFELLER PLAZA · NEW YORK 20, N. Y.**

Reg. U.S. Pat. Off. **Trade-mark

TRICT OFFICES: Boston, Massachusetts; Philadelphia, Pennsylvania; Baltimore, Maryland; Charlotte, rth Carolina; Cleveland, Ohio; Cincinnati, Ohio; Chicago, Illinois; Kalamazoo, Michigan; Detroit, Michigan; Louis, Missouri; Azusa, California; Seattle, Washington. In Canada: Dillons Chemical Company, Ltd., ntreal and Toronto.

r low-cost chemical equivalent of distilled $H_2O$ . . ! FILT-R-STIL* Demineralizing Units.

# Remote Control

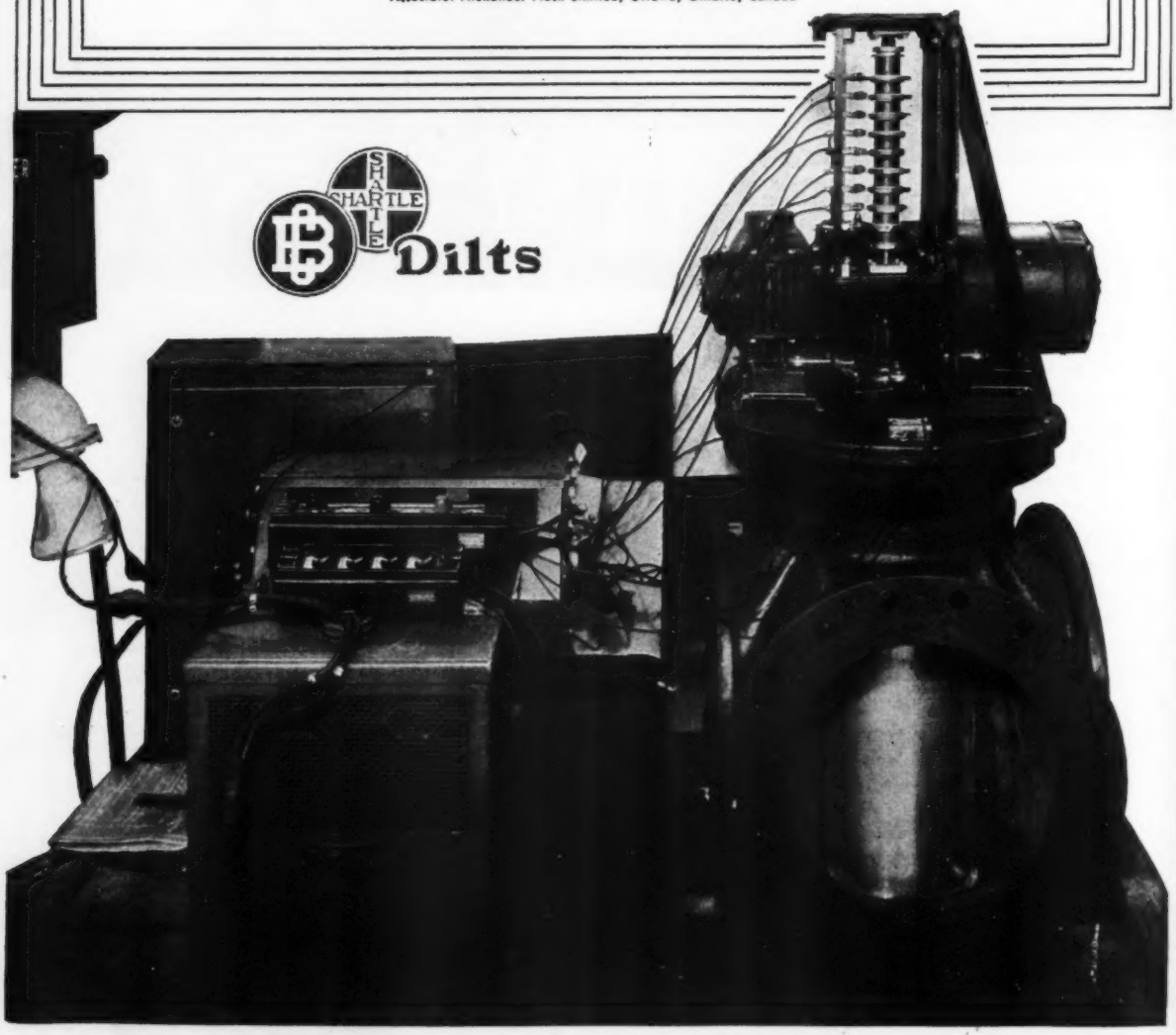
## ELECTRICAL OPERATION

### MIAMI ROTARY VALVES

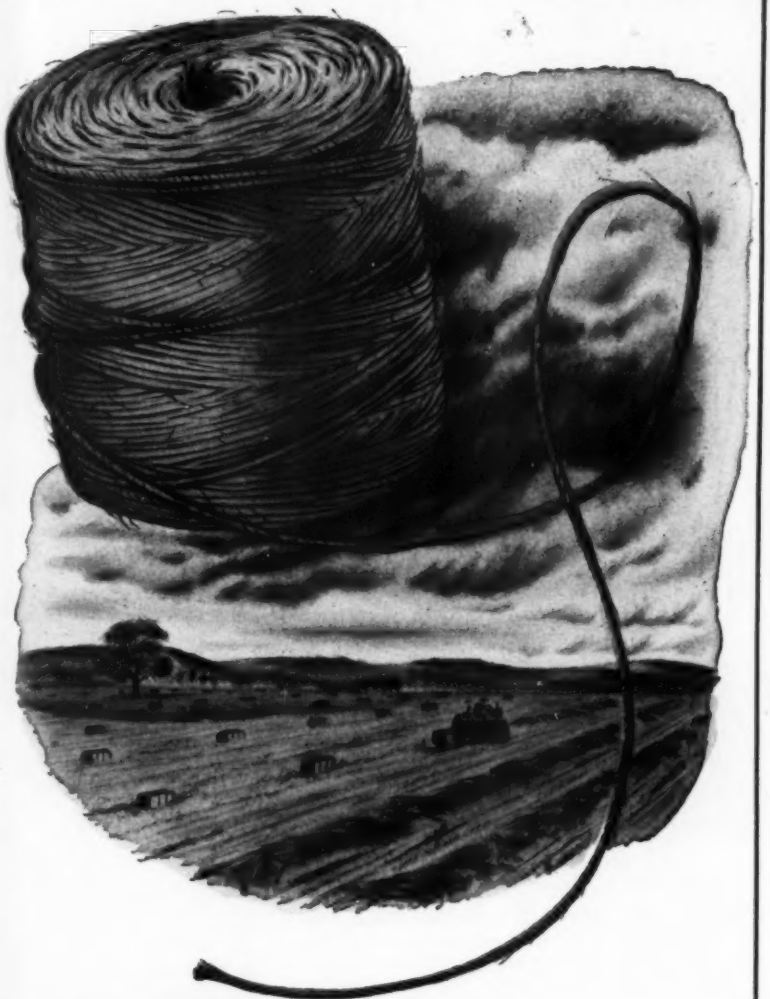
*2-way . . . 3-way . . . 4-way*
*With or without non-corrosive linings*
*In all required sizes*

**Shartle Bros. Machine Company**
MIDDLETOWN, OHIO

DILTS MACHINE WORKS, FULTON, NEW YORK
*Divisions of The Black-Clawson Co., Hamilton, Ohio*
Associate: Alexander Fleck Limited, Ottawa, Ontario, Canada



# BINDING PROTECTION against mold and decay



**DOWICIDES make cordage last**

Many manufactured products used in farming—like other materials that must be protected from mold and decay—attest the preservative value of Dowicides.

Sisal twine, for example, is widely used in hay balers. And harsh sisal fibers must be lubricated with warm oil to twist properly in twine-making machines.

Dowicides, added to this cordage oil, protect the finished twine. For several years the Dowicides have been used successfully for this purpose.

Many kinds of fibers—cotton, jute, sisal, hemp—now receive Dowicide protection. And it's the same kind of protection that Dowicides give—to products and processing materials alike—in the paper, cordage, leather, paint, lumber and other industries hampered by mold, termites and bacteria. If these destroyers are your problem, ask Dow about Dowicides today.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit
Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle
Chemical of Canada, Limited, Toronto, Ontario


## CHEMICAL COMMENTS

### Dowflake Makes Ballast for Tractor Tires

It's common practice to fill tractor tires with a liquid to add weight and increase drawbar pull. One of the most widely used ballast solutions is made with water and Dowflake (Dow Calcium Chloride 77-80%). It doesn't harm tires, protects against freezing down to −40° F., and makes a solution as much as 25% heavier than water. Dowflake is also used in fields as diverse as the quick-freezing of foods, the control of dust on roads and playgrounds, and absorbing moisture from the air in damp basements.

### A Flavor that Checks Mold

One of the "specialties" manufactured by our Aromatics Division has been found to have dual utility. The product, called Palatone (Trade Mark) has found wide use as an intensifier in berry flavors and as a sweetener in chocolate products. On the basis of experiments recently completed by Dow's Biochemical Research Laboratory, it has been shown to be an effective fungistat also, even in the small concentrations at which it is used as a flavor constituent.

### Phenolic Resins Aid in Weather-Proofing Plywood

Phenolic adhesives, produced in a variety of forms, are widely used in the plywood industry. Phenol, or mixtures of phenol and cresylic acid, when reacted with formaldehyde in the presence of caustic soda as a catalyst, produce resins of particular interest to plywood manufacturers. So called "exterior" plywood which must be resistant to almost all types of weathering are made with such phenolic adhesives. Water-soluble phenolic resins are also used extensively in the manufacture of plywood because of their economy in use and freedom from fire hazard.

*Further information on any other chemical developments is available on request.*


DOW

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TREMENDOUS SAVINGS FROM ROLL HANDLING
Tremendous savings are being made with Cleveland Tramrail Roll Handling Systems in many plants. Spoilage is greatly reduced. Handling speeded. Storage capacity of a room increased 50% to 150%. This equipment will help you lower costs. Let us give you the complete story.
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ROLL HANDLING
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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

# Quick-Change Artists

When a Fourdrinier grinds to a halt and plays dead for from three to five hours while the wire is being changed, down-time levies a brutal toll on a paper-mill's profits.

Obviously, then, when Moore & White announces that it can reduce this necessary fortnightly operation on high-speed paper-making machines to 30 minutes—oh's, ah's, cheers, and an immediate investigation are in order.

Let's translate the performance of the Moore & White quick wire-change Fourdrinier into increased tonnage, extra profits. A 1400-foot-per-minute newsprint machine, with a 160-inch wire, produces at the rate of some four tons per hour. Conservatively estimating the time saved on a quick-change Moore & White Fourdrinier at two hours for each biweekly wire change, that's eight tons of extra production every two weeks—at least *208 more tons per year*, at $90 per ton!

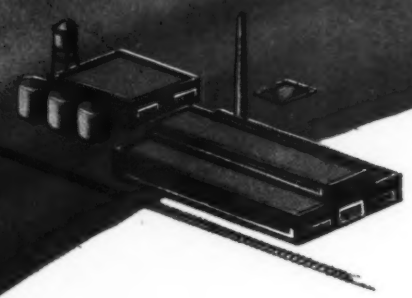
That comes to five figures—big ones—to perk up the balance sheet. Actually, you can expect this Moore & White advancement to liquidate its cost in the first six months of use. Ask us for proof.

**The MOORE & WHITE Company**

15TH STREET AND LEHIGH AVENUE • PHILADELPHIA 32, PA.

*CUSTOM-BUILT MACHINES FOR PAPER MAKERS*

# OUR PLANTS BLOOM THE YEAR 'ROUND



## ...so when it's Basic Chemicals for American Industry

## *call on GENERAL CHEMICAL first!*

At every point of the compass . . . wherever Industry is centered . . . there is a General Chemical producing works or distributing station serving the territory. To supply Industry's requirements across the country, General Chemical has 33 major producing locations from which pour a steady stream of essential chemicals.

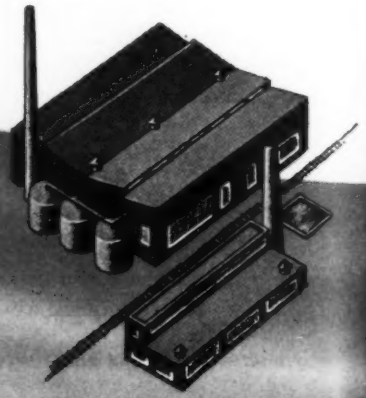
These include acids—alums—sodium compounds—fluorine derivatives —other heavy chemicals—as well as reagents, fine and pharmaceutic chemicals. Thus, coast to coast, a full flow of this broad and varied range of products, so necessary to peak production, is assured.

That is why . . . in every branch of Industry everywhere . . . the choice is General Chemical *first* in "Basic Chemicals for American Industry."

**GENERAL CHEMICAL DIVISION**
ALLIED CHEMICAL & DYE CORPORATION
**40 Rector Street, New York 6, N. Y.**
*Offices Serving Industry from Coast to Coast*

BASIC CHEMICALS

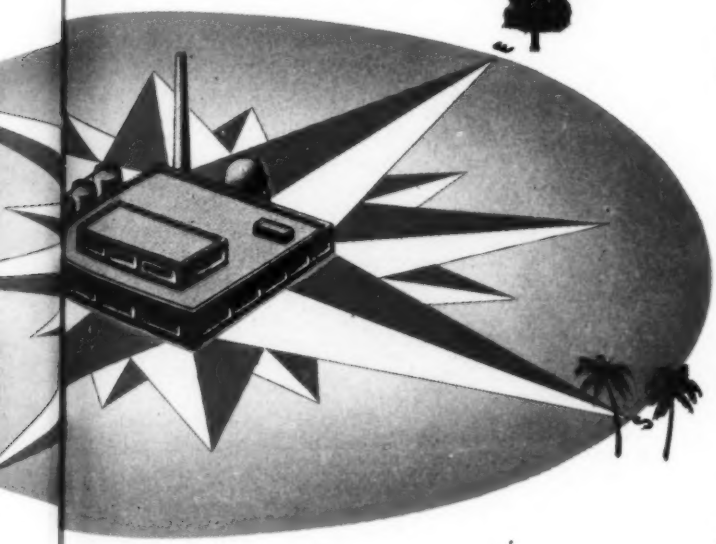
FOR AMERICAN INDUSTRY



# ..IN YOUR BACK YARD!

***General Chemical Producing Works include:***

- ✔ Atlanta Works, East Point, Ga.
- ✔ Baker & Adamson Works, Marcus Hook, Pa.
- ✔ Baltimore Works, Baltimore, Md.
- ✔ Baton Rouge Works, Baton Rouge, La.
- ✔ Bay Point Works, San Francisco (Port Chicago), Calif.
- ✔ Boston Works, Medford, Mass.
- ✔ Buffalo Works, Buffalo, N. Y.
- ✔ Calumet Works, Chicago (Hegewisch), Ill.
- ✔ Camden Works, Camden, N. J.
- ✔ Chillicothe Works, Chillicothe, Ohio
- ✔ Delaware Works, North Claymont, Del.
- ✔ Deming Works, Deming, N. M.



- ✔ Denver Works, Denver, Colo.
- ✔ Detroit Works, Detroit (River Rouge), Mich.
- ✔ East St. Louis Works, East St. Louis, Ill.
- ✔ El Segundo Works, Los Angeles (El Segundo), Calif.
- ✔ Front Royal Works, Front Royal, Va.
- ✔ Hudson River Works, Edgewater, N. J.
- ✔ Jacksonville Works, Jacksonville, Fla.
- ✔ Johnsonburg Works, Johnsonburg, Pa.
- ✔ Kalamazoo Works, Kalamazoo, Mich.
- ✔ Menasha Works*, Menasha, Wisc.
- ✔ Middletown Works, Middletown, Ohio
- ✔ Monroe Works, Monroe, La.
- ✔ National Works, Cleveland, Ohio
- ✔ Newell Works, Newell, Pa.
- ✔ New Orleans Works, Marrero, La.
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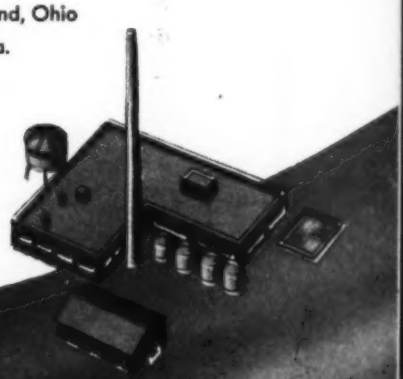
- ✔ Pulaski Works, Pulaski, Va.
- ✔ Richmond Works, San Francisco (Richmond), Calif.
- ✔ Savannah Works, Savannah, Ga.
- ✔ Vancouver Works, Vancouver, Wash.
- ✔ Wisconsin Rapids Works*, Wisconsin Rapids, Wisc.

*General Chemical Company, Inc.

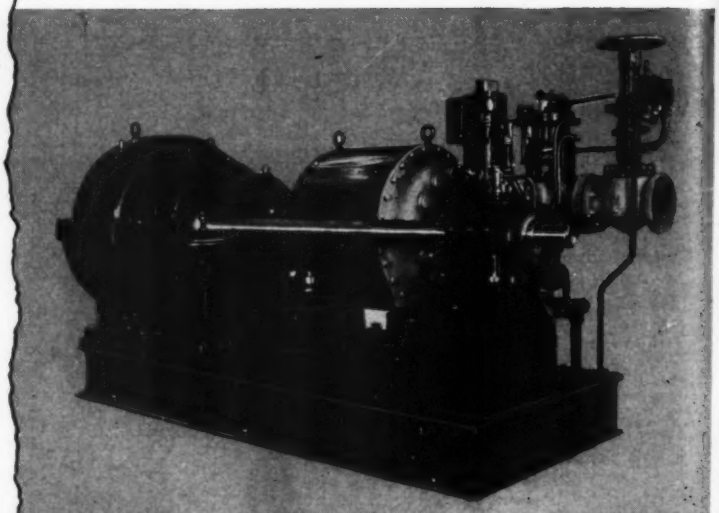


# ELIMINATE SPEED FLUCTUATIONS

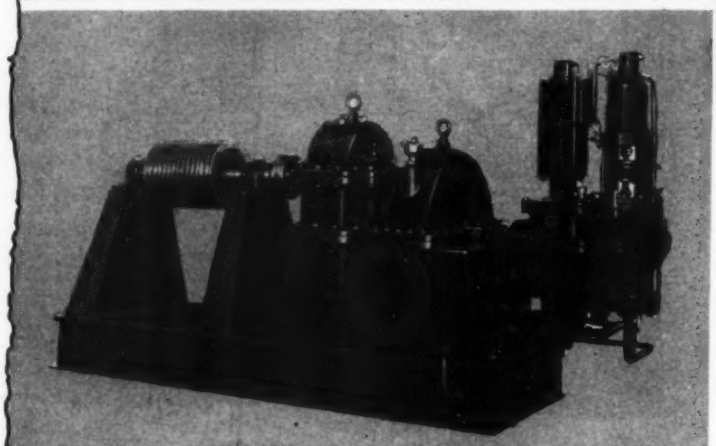
## with Worthington Paper Machine Drives

Continuous steady speed operation invariably follows when Worthington Steam Turbines take over the driving job The isochronous governor assures no change in operating speed from minimum to maximum load for any given control setting A special single-seated governor valve or valves give stable operation at low loads. In addition, the governor is adjustable over complete range to accommodate any paper machine requirement — remote speed controls can be provided if desired. Turbine-driven auxiliary oil pump protects against shutdown from power failures.

Whether your conditions call for automatic or hand nozzle control, direct connection or belted to line shaft, you can depend on Worthington to manufacture a smooth-running, economical steam turbine for any size of paper or board machine. Call your nearest Worthington office for more information proving that — in steam turbines as in so much other equipment — *there's more worth in Worthington*. *Worthington Pump and Machinery Corporation, Steam Turbine Division; Wellsville, New York.*



Worthington Steam Turbine with double extended gear shaft for direct connection into the line shaft of a large paper machine

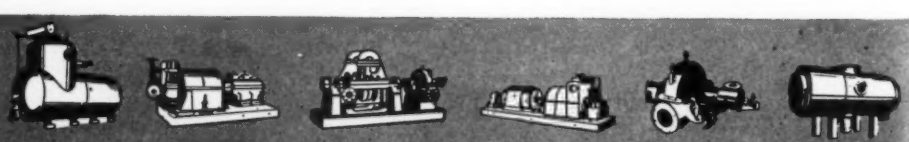


A small Worthington paper machine drive unit for belting to drive shaft

**WORTHINGTON**

T7-4

**A GREAT TEAM IN STEAM**



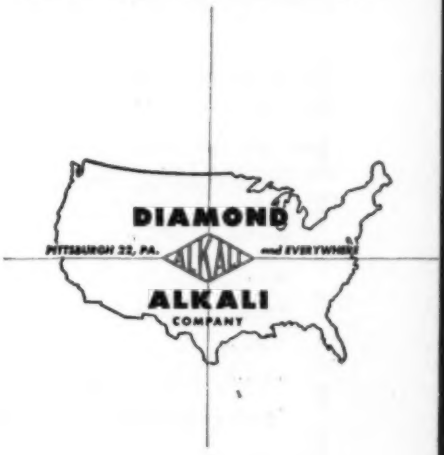
In the manufacture of pulp and paper, Diamond products serve in many ways. One of the most important chemicals used by paper-makers is Chlorine, the major application being for bleaching paper pulp. Diamond is a large supplier of Liquid Chlorine. Chlorine is employed also for slime control in paper mills by treating the entering water as well as white water suspension with this product.

Diamond Soda Ash and Caustic Soda are both used in the process of digesting pulp, and for de-inking and reclaiming waste paper. The high quality and uniformity of these Diamond products is well-known to manufacturers of paper and pulp.

A relatively new Diamond product, Chlorowax, is used in paper treating formulae. Chlorowax improves gloss, increases water-repellency and adhesion. Diamond Calcium Carbonate also is used for paper coating.

In this industry as in other industries served by Diamond, the uniformity and high quality of Diamond products improve manufacturing processes and aid in maintaining the quality of the finished product.

**The mass-production methods employed in the manufacture of paper-pulp make good use of the uniform dependability of Diamond products.**



AN ENCYCLOPEDIA OF CORROSIVE-HANDLING EQUIPMENT

36 TYPES OF EQUIPMENT MADE OF DURCO CORROSION-RESISTING ALLOYS

PUMPS, PIPE, VALVES, FANS, HEAT EXCHANGERS AND OTHER ACID-HANDLING EQUIPMENT

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**THE DURIRON CO., INC., DAYTON 1, OHIO**

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DURCO

Here is a new, 8-page general catalog issued by the largest organization in the world devoted exclusively to the production of *corrosion-resisting* alloys and equipment.

**This catalog:**

1. Describes **Durco corrosion-resisting alloys — Duriron, Durichlor, Durimet, Chlorimet, and Durco D-10,** stating composition, physical and mechanical characteristics, and names the corrosives for which each alloy is recommended.

2. Describes **Durco equipment** made of above alloys, as well as of **Monel, Pure Nickel, Inconel, Ni-Resist and Nickel Cast Iron.**

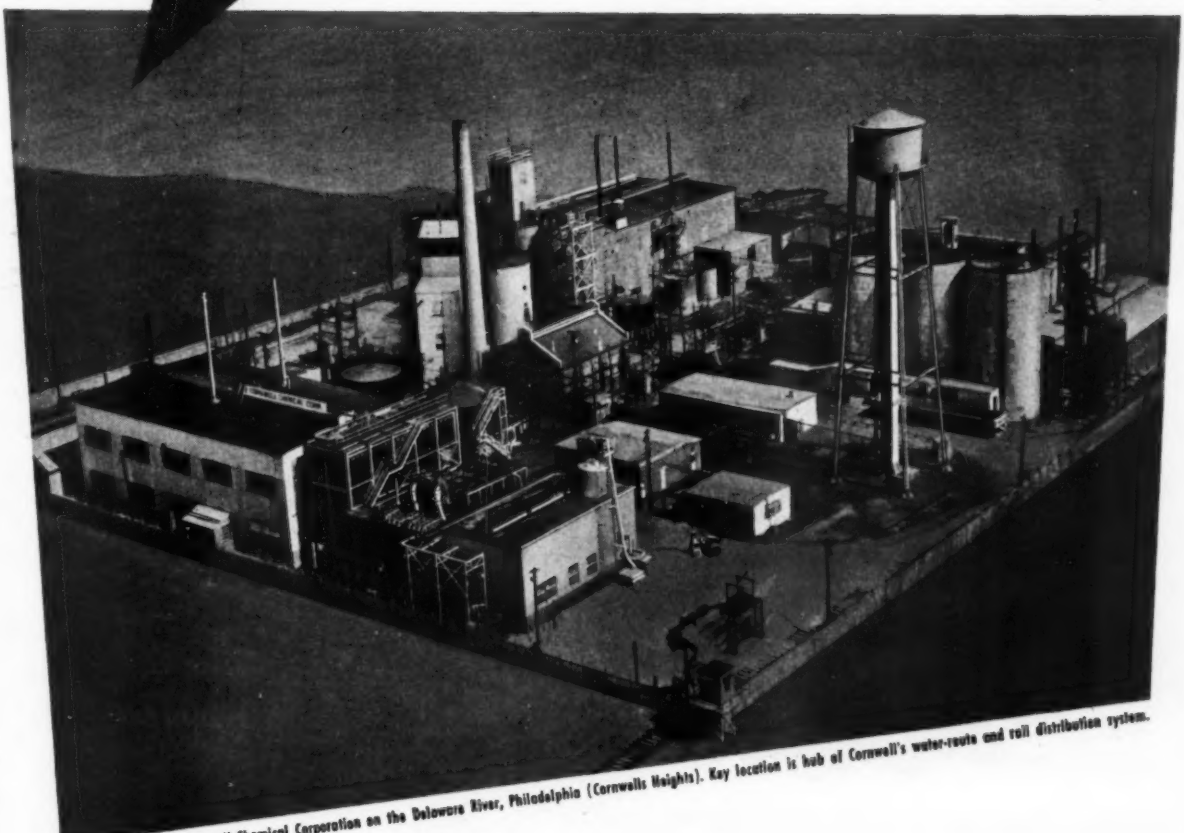
3. States **features** of each type of equipment, also **sizes, capacities** and the **alloys** in which it is available.

**THE DURIRON CO., INC., DAYTON 1, OHIO**

***Branch Offices in Principal Cities***

DURCO Adv. 53-GM

# SALT CAKE .....paper makers' grade



Plant and Laboratories of the Cornwell Chemical Corporation on the Delaware River, Philadelphia (Cornwells Heights). Key location is hub of Cornwell's water-route and rail distribution system.

**Cornwell Chemical Corporation**

CORNWELLS HEIGHTS (PHILADELPHIA), PA.

Telephone: Torresdale (Phila.) 4-7358 Cornwells 0302 Cables: SEECHEM

# KALAMAZOO GLAZED TILE TANKS ARE IDEAL FOR PAPER MILL NEEDS

The easy-to-clean, smooth surface of Kalamazoo Tile makes stock flow rapidly. Never deteriorates and practically no upkeep cost. Extreme strength and suitable for tanks and chests of all sizes and shapes.

Scores of large paper mills use this modern material because of its efficiency and permanently low cost.

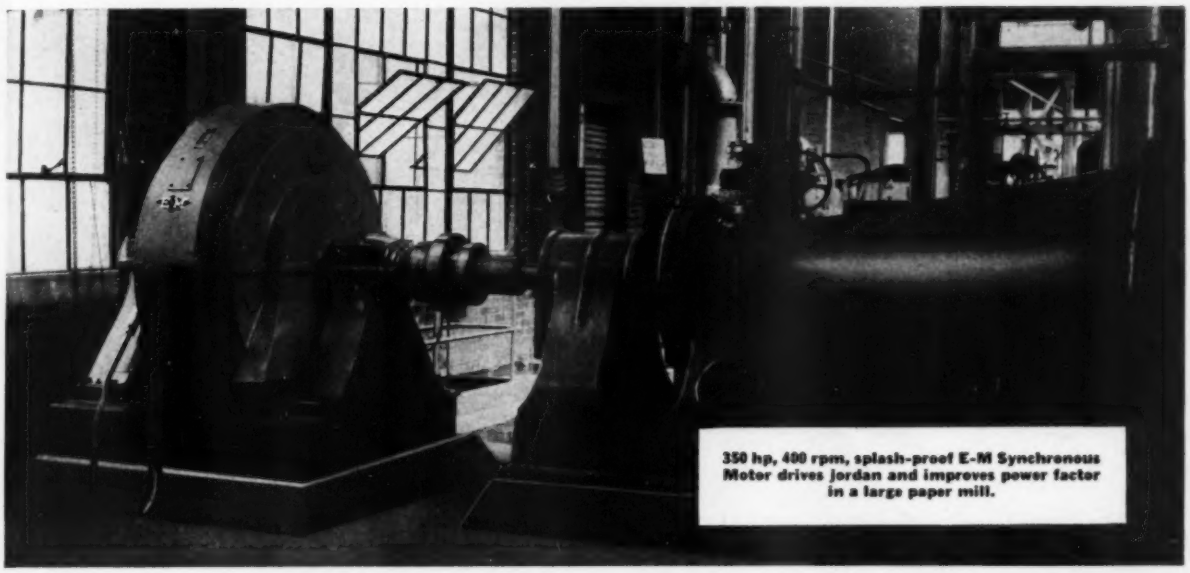
Ask Kalamazoo engineers for complete information.

*

## KALAMAZOO TANK & SILO CO.

KALAMAZOO • • • • MICHIGAN

# Paper Mills get DOUBLE VALUE from E-M SYNCHRONOUS MOTORS



350 hp, 400 rpm, splash-proof E-M Synchronous Motor drives jordan and improves power factor in a large paper mill.

### VALUE *1*—E-M SYNCHRONOUS MOTORS PROVIDE THE MOST EFFICIENT DRIVE

You can't select a *better* motor for a jordan drive than a "built-for-the-job" E-M Synchronous Motor. Direct-connected to the jordan, these high-torque, easy-starting motors provide smooth, powerful, constant-speed operation unaffected by load or voltage variations. Because they operate at high efficiency you get the lowest power cost . . . because of their rugged construction you get the long life, dependable motor service you need for trouble-free jordan operation. Splash-proof and drip-proof protection is available for wet locations.

### VALUE *2*—E-M SYNCHRONOUS MOTORS OFFER EXTRA ECONOMY IN IMPROVED POWER FACTOR

Because they are built to operate at *unity* or *leading* power factor, E-M Synchronous Motors on your jordans can *help reduce your power costs and improve the efficiency of power system.* This is a plus-value in performance in addition to the drive. It helps compensate for low power factor caused by other motor drives . . . helps you maintain unity power factor in mill.

E-M field engineers are specialists of long experience in synchronous motor applications. They can help you take most advantage of these high efficiency motors in *your* mill.

*And here are other ways your mill can use*

**SYNCHRONOUS MOTORS**

**1. GRINDERS, no matter how large, are best driven by powerful E-M Motors. Assures maximum dependability in performance.**

**2. CHIPPERS give most tonnage through steady, constant-speed operation of E-M Motors. Unsurpassed for chipper drives.**

**3. BEATERS driven by E-M Synchronous Motors afford a good means of power factor correction.**

**4. PUMPS, AIR COMPRESSORS, PULPERS, REFINERS, VACUUM PUMPS, have highest operating efficiency when driven by E-M Synchronous Motors.**

**ELECTRIC MACHINERY MFG. COMPANY**
Minneapolis 13, Minnesota

*Have you sent for Your Copy?*
20-PAGE BULLETIN,
"ABC of Synchronous Motor Control"

"DOUBLE VALUE" SYNCHRONOUS MOTORS

A2002 HIGH-SPEED LOW-SPEED ENGINE-TYPE "PACKAGED"

America's
Christmas Joy
"Joy to the World"
stands out
among our beloved
Christmas carols this year
with a new message.
Only in giving to those
who have not, does one really
feel the true happiness that
expresses the gay greeting
Merry Christmas!

# Michigan Paper Co. Passes to Newspaper Ownership

▶▶▶ THE CONTROL OF the Michigan Paper Company, Plainwell, Michigan, passed to joint newspaper ownership on November 17. The new owners, the Booth Newspapers, Inc., and the Evening News Association, publisher of the *Detroit News*, announced this transaction through their representatives, Warren S. Booth and William E. Scripps, presidents, respectively.

The plant at Plainwell has three papermaking machines, and the new owners state that one machine will be devoted to the manufacture of newsprint from de-inked pulp. The buyers state this move was made because the critical shortage of newsprint has made it practically impossible to maintain an adequate supply of paper to fill their demands. The newsprint turned out by the one machine will be distributed among a number of newspapers to relieve the present shortage. The Booth Industries own newspapers in Grand Rapids, Flint, Bay City, Saginaw, Kalamazoo, Jackson, Muskegon, and Ann Arbor. Of these, the *Kalamazoo Gazette* is located nearest to the mill at Plainwell.

The two remaining paper machines at Plainwell will continue to turn out the same grades of paper as before in order to serve the company's regular customers.

Dwight L. Stocker, president and general manager of the Michigan Paper Company, will continue in the same capacity. Members of the board at the time the transaction was completed were: H. Clair Jackson, George A. Pelgrim, Ethol W. Stone, Chas. W. Woodhams, William J. Lawrence, Merrill W. Taylor, and Dwight L. Stocker.

Mr. Stocker has been president of the company since December, 1935. He succeeded George W. Gilkey, who was fatally injured in an automobile accident that year. John W. Gilkey, father of George, had been president of the company when he passed away in 1918.

The plant at Plainwell was first established in 1872 when Benjamin F. Lyon, pioneer of the papermaking industry in Kalamazoo, went to Plainwell and joined up with Hale W. Page. They went into business under the name of the B. F. Lyon Paper Company and built a small wooden mill which turned out two to three tons of newsprint and book paper daily.

The present company was organized and expanded in 1887. As the business grew, capital was increased, and in 1906 a new building was constructed. Further growth increased the capitalization to $1,000,000 in 1917.

In 1927, the Michigan Paper Company took over the Bradford Paper Company plant in Kalamazoo as a coating department. That operation was later moved to Plainwell and has operated there since.

## GENEVA TARIFF AGREEMENT

The following special report was issued by Warren B. Bullock, manager of the Import Committee of the American Paper Industry under date of November 18:

In reciprocal trade agreements made public by the United Nations on Tuesday, November 18, tariff reductions were made on grades of paper in every paper paragraph of the United States Tariff Act—except one—in many cases to the maximum amount allowed by law. The one exception is that covering uncoated printing papers, including groundwood printing papers and book papers. In many respects this is the most important item to the American paper industry as a whole, as printing papers are the yardstick on which the entire industry's activities are measured. The duty rate on such papers was bound at the present rate of one fifth of 1 cent per pound and 5 per cent.

On the other hand, practically every grade of writing and similar papers suffered the maximum amount of rate reduction, average duties of 3 cents per pound and 15 per cent being reduced to 1½ cents per pound and 7½ per cent. High grade tissues were also subjected to rate reductions. Cover, blotting and coated papers (both printing and decorative) and vegetable parchment were subjected to tariff reductions of 50 per cent of existing rates.

Glassine and low grade tissue papers escaped tariff reductions, although glassine was originally scheduled as an item for negotiation.

The key countries which has provisionally signed the agreements are Canada, United Kingdom, Austria, France, and the Benelux Customs Union which includes Netherlands, Belgium and Luxembourg.

A preliminary announcement of the duty reductions was issued Monday, November 17, by the State De-

partment, but included only half a dozen paper items. The complete text lists about forty-five items.

The agreements with the key countries become effective January 1, if so proclaimed by the President. Agreements with the other countries are expected to become effective before July 1, 1948. In some instances the President's proclamation cannot be issued until the signatory nations secure approval by their home governments. Canada, for instance, has called its Parliament into session December 5. Congressional approval is not required on the part of the United States, the President having already been given authority to put any of the agreements into effect.

Compensatory tariff reductions by other countries are practically negligible as relates to paper items. Concessions by other countries, in return for the reduction of United States rates, are on such items as automobiles, machinery, agricultural products and the like. A reduction in the British Empire preference system affects some duty rates imposed by Canada and Australia, as well as the United Kingdom.

(*The complete schedule of United States rate reductions on paper appears on pages 1354-1355 of this issue.*)

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▶▶▶ THE TREE FARM movement enlisted its eighteenth and nineteenth states in October when Virginia and Pennsylvania launched locally sponsored programs. Virginia certified twelve units with 42,000 acres on October 24, while Pennsylvania dedicated nine timbered areas with 1,174 acres. According to the American Forest Products Industries, Inc., of Washington, D. C., national co-ordinators of the Tree Farm Program, acreage now nears the fifteen million mark with 1,300 woodlands now being operated under the strict forest management advocated by the movement.

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## BRITISH PAPER NOTES (October, 1947)

The arrangements for the British paper trade for the new license period (November to February) have now been presented. They are certainly uninspiring because permitted production of many of the more useful paper codes has been reduced, owing to the heavy decline in the importation of wood pulp. Consequently, several of the quotas to paper consumers have been correspondingly lowered. Also, all sales of paper even down to small lots from merchants now have to be recorded so that the Paper Control may have this information at a later date if necessary. The purpose of these statistics is to obtain a general idea of the use to which the present supplies of paper are put.

It is noted that in all these arrangements the governing word is exports. Carried to its logical conclusion, home consumption will be still further starved for the benefit of the export trade. But unfortunately there are several factors which may have a considerable bearing on this desire for increased exports. Will the export market demand continue to hold? Some indications are that it is less free than a few months ago. Also, will quality, based on the inferior materials which are at present of necessity being used by British papermakers, meet with general acceptance in a more exacting export market? Finally, will present export prices be maintained? All these queries doubtless will be answered during the next few months. But in regard to quality, the excellent standard of most of the present British papers is certainly surprising in view of the difficulties being met in every direction. In the majority of cases there is little difference between today's makings and prewar.

Meanwhile the paper trade again is not considered among the more important industries, therefore, is in a position to be affected by the new Direction of Labor Order. However, as the government is now by far one of the greatest consumers of paper, there is a remote possibility that it may come to appreciate the importance of paper not only to carry out its orders but to keep industry going.

It is noted that book publishers quotas have been maintained at their present high level and although the production of newsprint is as high as last year, the reduced sizes of newspapers continues. It is extremely difficult to square this maintenance of four-page papers, which was the wartime size, with newsprint production twice as high as during the war years and newsprint imports this year nearly double the amount received last year. Somewhere a great deal of newsprint is accumulating as exports of newsprint are on a very low scale. Without further information on the subject, only one conclusion may be drawn.

Again it is difficult to understand why book publishers quotas are maintained when publishers of periodicals are to be subjected to a 10 per cent cut. Merchants bulk quotas upon which the general printer depends are also cut (as are the bulk licenses covering small lots licensed during March-June, 1945), the replacement of which was freed from individual licenses.

Among other present difficulties is a shortage of water owing to the extremely long spell of dry weather which has seriously affected a few of the mills.

There is, however, one bright spot in the picture. After many months of hard struggling by the Waste Paper Recovery Association, the collection of waste paper by local authorities is showing an upward tendency. During July, this reached 31,756 tons, the highest monthly total for three years.

This rate of collection represents 5.2

*Virginia's first Tree Farm award is presented. M. M. Jones (right) gets certificate from Governor William M. Tuck*

PAPER · · · America's 6th Industry

# FAREWELL TO TARNISH

(NEWS ITEM: *Disposable paper sheets eliminate much of the inconvenience usually connected with polishing silver.*)

Here is a new, easier way to polish silver—with paper. The new housewife merely wets her silver, rubs lightly over the wet silver with polishing paper, rinses and drys. Presto! she has gleaming silver, minus dirty rags and tired fingers. With disposable silver polishing paper, the cleaning and polishing properties are sealed right in the paper. If your neighborhood store does not carry this new paper product, we will gladly supply manufacturers' names.

Paper clotheslines . . . paper ice bags . . . paper drapes . . . dusting paper . . . new uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities—new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, one for white paper for bags, one for Kraft liner board, and one for Kraft paper for multi-wall bags; also one Cylinder machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for the manufacture of M. G. Kraft specialties, facial tissues, and high grade bristols.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

**THE PUSEY AND JONES CORPORATION**
**Established 1848. Builders of Paper-Making Machinery**
**Wilmington 99, Delaware, U. S. A.**

THE SIGN OF TRADE MARK SUPERIOR QUALITY

ounces per week per head of the country's adult population. The aim is to reach 8 ounces per head and thus provide 400,000 tons per annum, which, added to the waste paper merchants collections, should give a grand total of 800,000 tons, considered sufficient to keep the paperboard mills working to capacity.

That the British paper trade hopes one day to return to something like normal trading is confirmed by an interesting event recently held in London when three sections of the British paper trade and one from Belgium signed a quadripartite agreement on white and tinted box enamel papers. The sections concerned were the Association of Makers of Coated Papers, the Belgium makers of white and tinted enamels, the White and Tinted Box Enamel section of the National Association of Paper Merchants and the British Paper Box Manufacturers Federation.

During the luncheon which followed the signing it was recalled by L. C. S. Lewsey, chairman of the makers of coated papers, that several years before the war the makers of these papers were in the unfortunate position of selling below cost. The coated papermakers discussed the situation with the N. A. P. M. and the Belgium coated papermakers were invited to join in the discussion. This resulted in a tripartite agreement, but it was felt that the consumer should also be invited to join, hence the present quadripartite price agreement.

Confirmation of the decline in the imports of papermaking materials is contained in the Board of Trade returns covering September which disclose that the quantity imported during that month, 91,321 tons, was 28 per cent below the imports for August. Despite this fact the total imports for the first nine months of the present year are higher than for the previous year. This increase, however, is entirely due to imports of esparto grass which at 212,922 tons is over 134,500 tons higher than 1946. There has been a decline of over 16,000 tons in the receipts of chemical, dry, bleached wood pulp and nearly 20,000 tons in that of chemical, dry, unbleached. On the other hand, the imports of paper and boards now totalling 386,889 tons are over 170,000 tons up on last year. Practically every grade of paper and board is concerned in this increase even to newsprint which has advanced from 76,332 to 117,874 tons. Strawboards have increased by 59,000 tons and among the countries increasing their exports of paper and board to Great Britain it is noted that the United States have 14,980 to its credit over 10,000 up on 1946. Exports, despite the fuel crisis early in the year are steadily moving forward, and considering the setback the British mills received last February and March, it is very credible that they are beating their 1946 figures.

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▶▶▶ A NEW SALES AGENT for Swedish and domestic mills is the recently organized Christ Paper Products Corporation, of New York. The company will act as distributors of kraft, sulphite, and other pulps, and carry a general line of paper and paper products. Arthur P. Christ, Jr., president, has been associated with Camp Manufacturing Company (Franklin, Va.) for the past eight years and was with Union Bag & Paper Company the previous seven years.

*Arthur P. Christ, Jr.*

◆

## FINANCIAL

▶▶▶ YEAR END SELLING and uncertainty over the future due to the Marshall plan and European conditions tended to weakness in the securities markets in which paper mill stocks suffered somewhat, but not severely.

*Continental Diamond Corporation*—Net profit for nine months ended September 30 was $777,126 as against a loss of $57,734 a year ago.

*Gaylord Container Corporation*—Net income for the nine months ended September 30 was $7,065,514 as against $3,008,818 for the same period last year.

*Great Northern Paper Company*—Net profit for nine months ended September 30 was $3,107,558 as against $1,607,257 a year ago.

*Hinde & Dauch Paper Company*—Net income for the first three quarters was $2,457,526 as against $1,101,426 a year ago.

*International Paper Company*—Net profit for the quarter ended September 30 was $16,716,492 as against $9,161,847 for the same quarter of 1946. Nine months profit was $43,124,402 as against $21,252,904 for the same period a year ago.

*Kimberly-Clark Corporation*—Net income for the third quarter of 1947 was $1,369,832 and for the nine month period the net was $5,114,798.

*National Container Corporation*—Net profit for nine months ended September 30 was $8,288,615 as against $3,330,140 a year ago.

*Nekoosa-Edwards Paper Company*—Net income for nine months was $2,123,775 as against $707,712 a year ago.

*Puget Sound Pulp & Timber Company*—Net profits for nine months were $3,542,603 as against $784,622 a year ago.

*Rayonier Inc.*—Net profit for nine months ended September 30 was $6,083,795 as against $1,866,363 a year ago.

*United Wall Paper, Inc.*—Net income for the three months ended September 30 was $150,139 as against $478,211 for the same period a year ago.

### Paper Mill Corporate Changes

*Celotex Corporation*—An issue of $3,000,000 in 3¼ per cent debentures will be offered to the public to obtain funds for payment of outstanding bank loans of $2,500,000 accrued while the company was carrying out its expansion and improvement program.

*Puget Sound Pulp & Timber Company*—With the retirement of a $1,000,000 bank loan about the first of the year the company will be debt free.

*St. Regis Paper Company*—The Securities and Exchange Commission has been notified that 300,000 shares of stock, now currently selling at $10 per share, will be sold through the New York Stock Exchange. While St. Regis has filed this notice, the stock is owned by Weco Corporation, a subsidiary of Western Electric, and acquired by Weco as a part of the transaction by which St. Regis purchased the Bryant paper mill at Kalamazoo and the Hennepin mill at Minneapolis from the Time-Life-Fortune interests.

*Union Bag & Paper Company*—The Union Bag & Paper Company has purchased the Trenton Container Company (Trenton, N. J.), Union has also become a minority stockholder in the Highland Container Company

# count on UFORMITES 470 and 467 for an effective job at low cost

It's a simple matter to impart high wet strength to glassine for frozen food wrappings . . . or to other papers. . . when you use the UFORMITES.

If you're using Kraft stock for bag and wrapping papers, toweling, food wrappings or map papers, just add UFORMITE 467 at the beater.

Or if you're working with sulfite, rag or groundwood stocks . . . making glassine, sulfite wrapping paper, absorbent tissues, chart and ledger papers . . . then add UFORMITE 470 at the Jordan or head box.

No special equipment—no special handling with the UFORMITES! As little as 1% resin solids on dry fibre weight boosts wet strength *as much as 300%*. Dry tensile, Mullen, fold, uniformity of sizing and coating surface characteristics are all substantially improved too. And there's no effect on color, odor or taste of paper!

Get the full facts today!

UFORMITE *is a trade-mark, Reg. U. S. Pat. Off.*

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## THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

(Jamestown, N. C.) with an added provision that the Highland company will secure its containerboard from Union.

**New York Stock Exchange—Stocks**

| | Closing Prices Nov. 25 | Oct. 27 |
|---|---|---|
| A.P.W. Products | 5 | *5⅝-5⅞ |
| Celotex | 27 | 28 |
| Same Preferred | 20¼ | *20¼-20¾ |
| Certain-teed Products | 17⅞ | 18¾ |
| Champion P & F Co. | 22¼ | 24 |
| Same Preferred | 105 | 106 |
| Container Corp. | 42⅛ | 44⅛ |
| Same Preferred | 97 | 100 |
| Cont. Diamond | 11¾ | 11⅞ |
| Crown Zellerbach | 32½ | 32½ |
| Same Preferred | 101⅝ | 102 |
| Same $4 Preferred | 122¾ | *121⅜-126 |
| Dixie Vortex | 37½ | 40 |
| Same "A" | 54½ | 54¼ |
| Robert Gair Co. | 9¾ | 10¼ |
| Same Preferred | *19¾-20¾ | *19½-20½ |
| Gaylord Container | 22¼ | 20¾ |
| International Paper | 55⅞ | 57½ |
| Same Preferred | 98¼ | 100¾ |
| Kimberly-Clark | 23½ | 24⅛ |
| Same Preferred | 106¾ | 109 |
| McAndrews & Forbes | 39½ | *38¼-39½ |
| Marathon | 21¼ | 22¼ |
| Masonite | 54½ | 56 |
| Mead Corp. | 21⅜ | 23¼ |
| Same Preferred | 93½ | 92 |
| Same 2d Preferred | *45¼-47 | *38¼-50½ |
| National Container | 14⅛ | 14⅞ |
| Paraffine Cos. | 77½ | *71-73 |
| Same Preferred | 105 | *106½-109 |
| Rayonier, Inc. | 30¾ | 28⅜ |
| Same Preferred | 36¾ | 36⅞ |
| Scott Paper | 43⅝ | 46½ |
| Same Preferred | 96¾ | *98-98½ |
| St. Regis | 10¼ | 11¾ |
| Same Preferred | 91 | 92 |
| Sutherland Paper | 41 | *41-42½ |
| Union Bag & Paper | 33⅛ | 35 |
| United Paperboard | 16 | 16 |
| U. S. Gypsum | 104 | 104½ |
| Same Preferred | *179-183 | *180-184 |
| U. S. Wall Paper | 6¼ | 7 |
| Same Preferred | *39-39⅞ | 42⅛ |
| West Va. P. & P. Co. | 44 | 45¼ |
| Same Preferred | *106-107½ | 111¼ |

**New York Stock Exchange—Bonds**

| | | |
|---|---|---|
| Celotex 3½% | .... | .... |
| Champion P & F Co. | .... | .... |

**New York Curb Exchange—Stocks**

| | | |
|---|---|---|
| Am. Writing | .... | 10⅜ |
| Great Northern | 47 | 46½ |
| Taggart | .... | 10½ |

*Closing Bid and Asked Prices.

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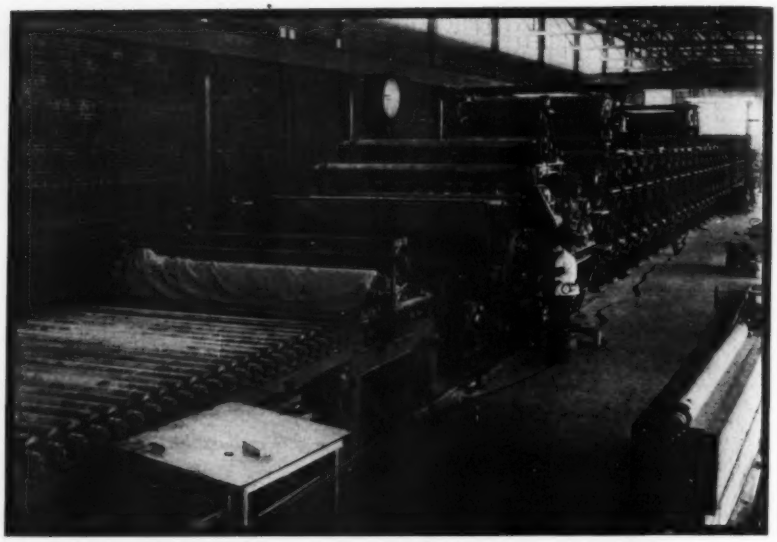
## NEW PAPER MACHINE AT W. C. HAMILTON & SONS PLANT READY BY JAN. 1

As part of its $1,000,000 expansion program, W. C. Hamilton & Sons, Miquon, Pennsylvania, have just installed a new papermaking machine, which is expected to be in operation by the first of the year. According to announcement by Hugo H. Benson, Hamilton president, the machine, which has a speed of 750 fpm, will produce more than 80,000 pounds of paper per day. The present capacity of the plant is 200,000 pounds. A new building houses this machine.

The new 120-inch machine is the seventh in the Hamilton plant. It was laid out by The Bagley & Sewall Company, which company also furnished the fourdrinier and presses. Suction couch and suction press were made by the Downingtown Manufacturing Company. The dryer section, the reel and winder were built by Moore & White Company. There is



*This new paper machine at plant of W. C. Hamilton & Sons is pictured here from the wet end. It is scheduled to roll before the first of the year*

a Westinghouse sectional electric drive. The new machine is on the second floor where there is parallel floor space for a second machine if needed in the future.

Auxiliary equipment which occupies part of the first floor includes: Hydrapulper and two Hydrafiners from the Dilts Machine Works; stock chests and cycling tanks, made by Stebbins Engineering Company, and two jordans made by Emerson Manufacturing Company.

The machine has been assembled by James Grauel, the Hamilton firm's chief engineer. President Hanson stated the machine cost $650,000 and the building $350,000.

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## PULPWOOD, EXTRACT WOOD AND COAL FREED FROM RATE RAISE BY SCC OF VIRGINIA

Pulpwood, extract wood, and coal were exempted from a 10 per cent increase granted railroads on basic freight rates and intrastate charges by the State Corporation Commission of Virginia on November 19.

At the time of the hearing, John C. Albert, general traffic manager of the West Virginia Pulp and Paper Company, Covington, Virginia, appeared and produced facts and figures to show that any increase in freight rates on pulpwood and extract wood at the present time would affect the company's productive capacity.

Mr. Albert also represented a number of corporations using the two commodities within the state. He convinced the Commission that freight rates on pulpwood and extract wood already were excessively high, and that any additional increase in rates would be a detriment to the present price structure.

The Commission's ruling on coal benefited paper manufacturers and the allied chemical industry, which are considered the largest commercial users of coal in Virginia. In its order the SCC stated that the largest intrastate movement of coal is to the plant of the Mathieson Alkali Works at Saltville.

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## CHANGES IN STAFFS OF QUEBEC AND N. H. MILLS ANNOUNCED BY BROWN CO.

Howard Philbrick who has had wide experience as an industrial engineer, has joined the Brown Company, Berlin, New Hampshire, as consultant to the manufacturing department in connection with the company's modernization program. Mr. Philbrick recently has been with the Celotex Corporation.

Another addition to the Brown Company staff is C. R. P. Cash, who has joined the pulp division. He formerly was superintendent of the Brown Corporation mills at La Tuque, Quebec. Succeeding Mr. Cash as superintendent at La Tuque is Albert E. Penney, who has been staff assistant to the works manager since last May.

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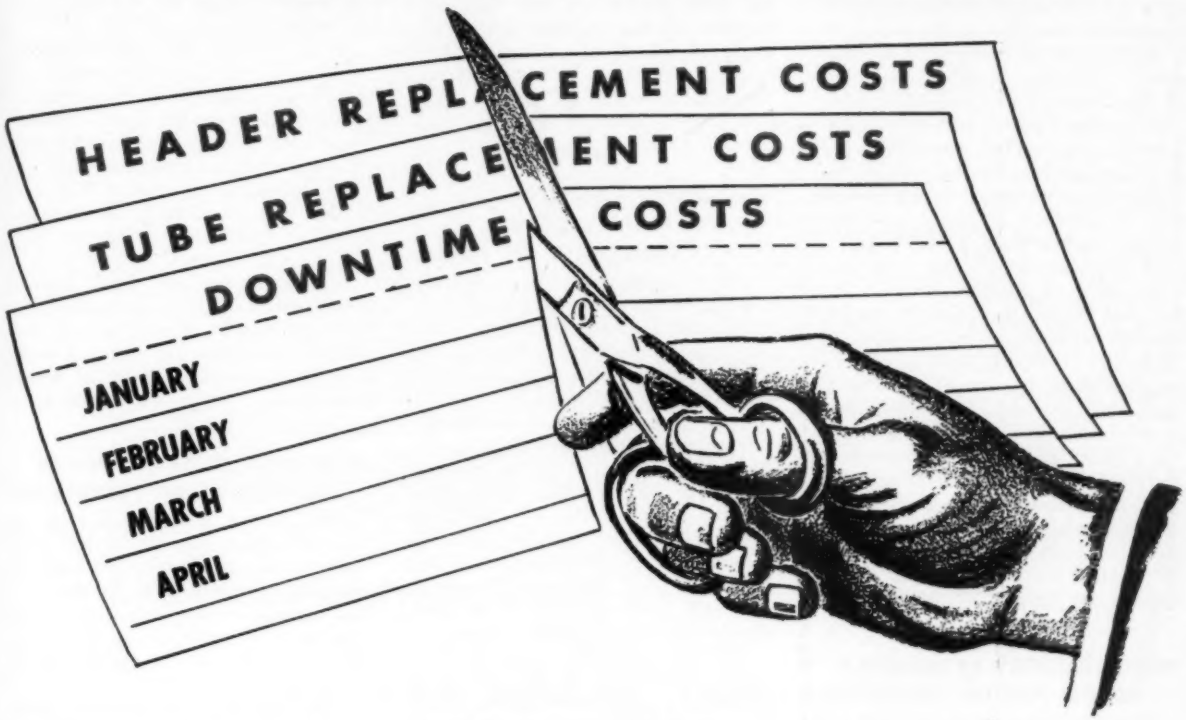
## IMPORT NOTES

Customs officials have classified a shipment of Finnish paper as writing paper, at 3 cents per pound and 15 per cent, instead of admitting it as printing paper at one fifth of 1 cent per pound and 5 per cent as claimed by the importers, according to Warren B. Bullock, manager of the Import Committee of the American Pa-

# How to cut 3 evaporator costs at once!




TIMKEN 5% nickel steel evaporator tubes assure you maximum tube life for every dollar invested. Because they average up to four times longer life than carbon steel tubes, their installation means a three-way cut in operating costs: 1) downtime is reduced; 2) tube replacement costs are lowered; 3) header wear and replacement costs are cut.

Timken evaporator tubes of 5% nickel steel are the product of eight years' intensive research by metallurgists of The Timken Roller Bearing Company. Laboratory studies and testing under actual plant conditions proved that Timken evaporator tubes of 5% nickel steel have the ideal combination of properties to economically resist black liquor corrosion.

The Timken Company assures uniform physical properties in every lot of Timken 5% nickel tubes. That's because every step of their production—from melt shop through final tube inspection—is completely controlled within the Timken Company's own mills.

You won't find another steel producer with this background of experience and research in high temperature applications. Why not use it to help solve *your* problems? Write Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

**YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH**

*Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing*

per Industry. It was the unanimous opinion of half a dozen domestic producers that the paper was writing paper, with all sulphite content. A second shipment of twenty tons of the same grade of paper has been received within the past few weeks.

Nearly thirty protests have been filed at Detroit against the inclusion of the Canadian sales tax in the value of Canadian dutiable printing papers. Twenty-five involve paper described as newsprint, but evidently a dutiable grade of printing paper. Three involve so-called premium magazine paper and another groundwood printing paper.

A shipment of Canadian material, a precise mixture of 50 per cent unbleached sulphite and groundwood, has been classified for duty at 20 per cent. Importers claimed it to be duty free as pulp, but the Import Committee took the position that it was pulp which had been further processed and for a special purpose and therefore not duty free, but dutiable at 30 per cent as a manufacture of pulp. Customs officials, while denying the material duty free entry, decided it was properly dutiable at 20 per cent as a non-enumerated article.

◆

## NEW BLEACHERY AT NEKOOSA BEGINS PARTIAL OPERATION

The first three stages of the new six-stage continuous operation bleachery are now in operation at the Nekoosa mill of the Nekoosa-Edwards Paper Company (Port Edwards, Wis.). With approximately fifty per cent of the equipment operating, present production amounts to from 90 to 95 tons of bleached pulp per day. It is expected all six stages of the bleachery will be in production early in December.

The bleaching equipment is housed in a 68 by 72 foot brick building composed of a basement and four floors. The water used in the new bleachery is processed and purified in the recently completed filter plant at Nekoosa which filters 3,600 gallons of Nepco Lake water per minute to a color of five parts per million or less.

◆

## NEW GRANT FOR PULP AND PAPER RESEARCH GIVEN TO UNIVERSITY OF MAINE

The University of Maine will receive an annual grant of $1,000 from the Gottesman Foundation to be used for the encouragement and promotion of scientific and industrial research in the pulp and paper field, Dr. Arthur A. Hauck, president of the university, announced on December 3.

The expenditure of funds from this grant for scholarships, fellowships, and for the promotion of research is to be administered by the president of the university, the director of the Department of Industrial Co-operation, and a representative of the Eastern Corporation of Brewer, Maine.

The first fellowship under the Gottesman Foundation at the university has been awarded Hsiang-chu Chun, a candidate for the M.S. degree in chemical engineering. The title of his research work is "An Investigation of the Relationship between Evaporation and Spray Drying of Sulphite Waste Liquor."

Another industrial fellowship that is being continued at the University of Maine is the Eastwood-Nealley Fellowship, established in 1944 by the Eastwood-Nealley Corporation, of Belleville, N. J. Funds provided by this grant are used for the encouragement of scientific and industrial research and are determined by mutual agreement between the company and the university.

At the present time the Eastwood-Nealley Fellowship is being prosecuted by Henry Fogler, of Hastings-on-Hudson (N. Y.), and Fred Herbolzheimer, of Wakefield, Massachusetts, who are candidates for the M.S. degree in chemical engineering. The title of their research work is "An Investigation of the Spray Drying of Sulphite Waste Liquor."

Investigations under both fellowship grants are being administered by Professor Lyle C. Jonness, acting head of the department of chemical engineering and the department of industrial co-operation at the university.

◆

## AILANTHUS TO BE GROWN IN INDIANA AS AN EXPERIMENT

The Indiana State Division of the United States Forest Service has gathered a supply of ailanthus tree seeds for early planting in one of the state forest nurseries. Fifty thousand will be planted as a starter and by 1949 some of them will be transfered to the state forests.

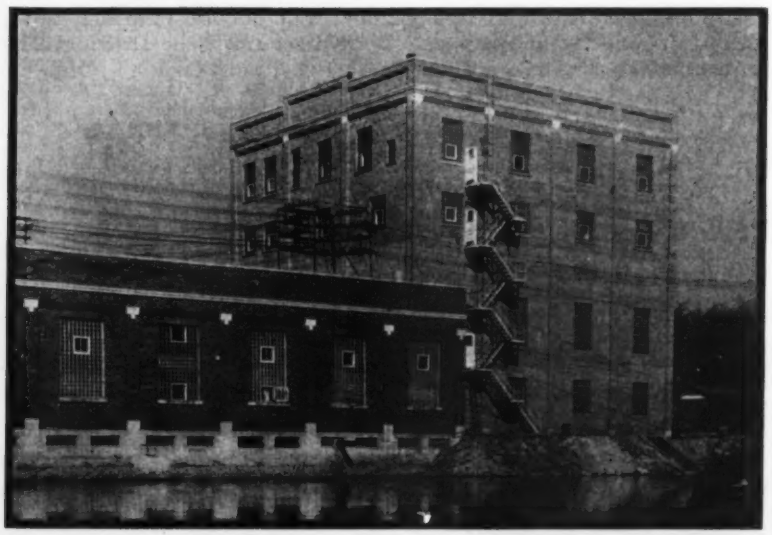
The growing of these trees (commonly known as the Tree of Heaven) is an experiment being conducted by Indiana State Forester Ralph F. Wilcox, who, according to report given by him to the U. S. Forest Service, believes the wood from this tree will produce pulp. Should the experiment prove this statement, many waste areas within the state will become productive. This would include large acreage of land left waste around mines, etc.

The ailanthus (or Chinese Sumach) tree comes from the Orient where it grows quite rapidly. It is not killed or stunted by coal smoke and gases, and is considered a nuisance in cities where it takes root and thrives against the foundations of buildings.

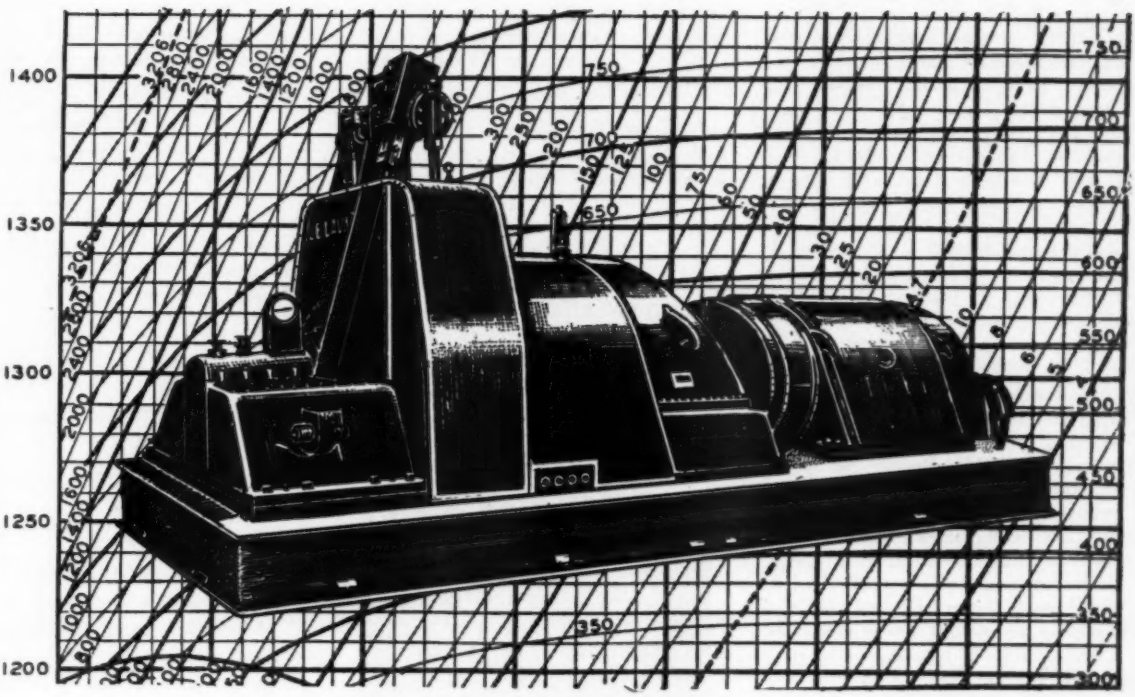
◆

## REPORT ON PRODUCTION FOR 1947 ISSUED BY GOVT. PRINTING OFFICE

Government Printing Office production for the fiscal year 1947, according to Public Printer Augustus E. Giegengack's annual report, shows a $53,000,000 volume of public printing, which is more than double prewar requirements. While the present figure is a third less than it was in the busiest war year, there is no evidence that further reduction of volume can be expected in the near fu-



*Pictured above is an exterior view of the new six-stage bleachery now in operation at the Nekoosa (Wis.) mill of the Nekoosa-Edwards Paper Co.*




# SKIM THE POWER CREAM

## *from process steam*

If you use appreciable quantities of steam consider the economy of generating all or a part of your own power by allowing the steam to expand through a De Laval Turbine before delivery to the heating or processing system.

De Laval Turbines can be furnished with automatic controls designed to make exhaust steam available in the quantities and at the pressures required to meet the demands of plant operation and the requirements of thermo-dynamic economy.

May we have the privilege of submitting cost figures based upon the installation of a De Laval turbine selected to meet your plant requirements?

T-7

DE LAVAL

**DE LAVAL STEAM TURBINE CO.,** TRENTON 2, N. J.

Atlanta • Boston • Charlotte • Chicago • Cleveland • Denver • Detroit • Helena • Houston • Kansas City
Los Angeles • New Orleans • New York • Philadelphia • Pittsburgh • Rochester • Salt Lake City
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TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS • CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS AND COMPRESSORS • IMO OIL PUMPS

ture, it at all. The Congressional Record reached a number of new highs and congressional printing generally appears to be on the increase. Orders for some of the executive departments, including naturally War and Navy, have declined, but printing needs of the Veterans Administration, the Department of Agriculture and the Post Office Department are even greater than in wartime.

The Public Printer devotes the first pages of his report to the difficulties encountered by the Government in the procurement of paper. Quarterly bid openings are yielding only a fraction of requests. Current annual use of paper is reported to be at the rate of 180 million pounds.

Although rising costs of labor and material are boosting Government Printing Office charges to the departments, the Public Printer lists many effective methods he has adopted to counteract these increased costs. Notable among these is the extensive research program undertaken jointly with Printing Industry of America Inc. Aside from the new fields of study to be invaded, the report shows Uncle Sam's big printing plant to be abreast of the most modern development in the industry.

Government Printing Office cost accounting and production control procedures assure that each printing job carries every charge that may correctly be placed against it and at the same time guarantee the most economical method of production that is possible.

Shortages of qualified personnel persist in the technical divisions but the Office's reduced needs for other classes of workers are being met satisfactorily. There were 7,955 employees on the Office rolls at the end of the fiscal year, including 983 in the field duplicating plants, operated by the Treasury Department prior to being placed under the Public Printer on July 1, 1946.

Commercial procurement during the year was about $15,000,000 and is expected to remain near this level. The wartime difficulties of securing adequate contract sources no longer exist, the report states.

One of the most striking developments within the Office during the year was the emergence of the Public Document Division as a self-sustaining unit. Its receipts from public sale of official publications, more than $3,000,000 for 37,000,000 copies, enabled it to return to the Treasury an amount greater than its entire appropriation, while absorbing the cost of handling a wide department and congressional distribution program. Its new and better-located bookstore on North Capital Street is expected to offer greater incentive to purchase of public documents. One of the plans for the future is the establishment of regional bookstores.

Other plans of the Public Printer include a program of plant and equipment modernization, acquisition of additional storage and production space, and a review of the printing and binding laws, looking toward their revision in accordance with current needs and practices.

◆

## SYDNEY FERGUSON OF MEAD CORPORATION CHOSEN AS NEW PRESIDENT OF AFPI

Sydney Ferguson, president of the Mead Corporation, New York, was elected president of the American Forest Products Industries, Inc., at its annual meeting held in the Palmer House, Chicago, on November 20. Mr. Ferguson has been serving the industrial conservation organization as chairman of its finance committee.

*Sydney Ferguson*

He succeeds Corydon Wagner, vice president of the St. Paul & Tacoma Lumber Company. Mr. Wagner was one of the original group that started the public information project of the American Forest Products Industries in 1941, which since has developed into a nation-wide forestry program sponsored by forest industries of all types. The organization is the national co-ordinator of the "tree farm" and "Keep America Green" movements, and is undertaking a series of intensive programs to interest small woodland owners in better forest practices. The first of these programs is being initiated in Alabama, but similar projects will be undertaken in other states during 1948.

Other officers of AFPI, elected at the Chicago meeting, are Col. William B. Greeley, Port Gamble, Washington, chairman of the trustees; Walter J. Damtoft, Champion Paper & Fibre Company, and Robert C. Winton, Winton Lumber Company, vice presidents; H. L. Fleishel, Perpetual Forests, Inc., treasurer, and Chapin Collins, Washington, D. C., managing director and secretary.

C. O. Brown, International Paper Company; Clyde Martin, Weyerhaeuser Timber Company; and William Swindells, Willamette Valley Lumber Company, were elected to the board of trustees. Other board members, representative of the pulp and paper industry, will be announced later.

AFPI's trustees gave their approval to expansion of the Alabama type of forestry educational project to other states as well as of AFPI's general educational work.

◆

## UNION BAG ESTABLISHES NEW CONTAINER FACTORY AT TRENTON, NEW JERSEY

Union Bag & Paper Corporation, of Savannah, Georgia, has announced the purchase of the Trenton Container Company (Trenton, N. J.) and also the acquisition of a nearby factory building in which the equipment of the Trenton company and additional facilities will be installed.

This expansion is part of Union Bag's program to establish corrugated container factories in the country's important consuming centers. The new plant will service customers in the New York-Philadelphia area.

The Trenton factory building will be enlarged to 130,000 square feet, and the increase in equipment will bring the plant's capacity up to approximately 3,000 tons a month. R. W. Williams and E. E. Gaus, former owners of the Trenton company, will continue as local sales and operating managers.

◆

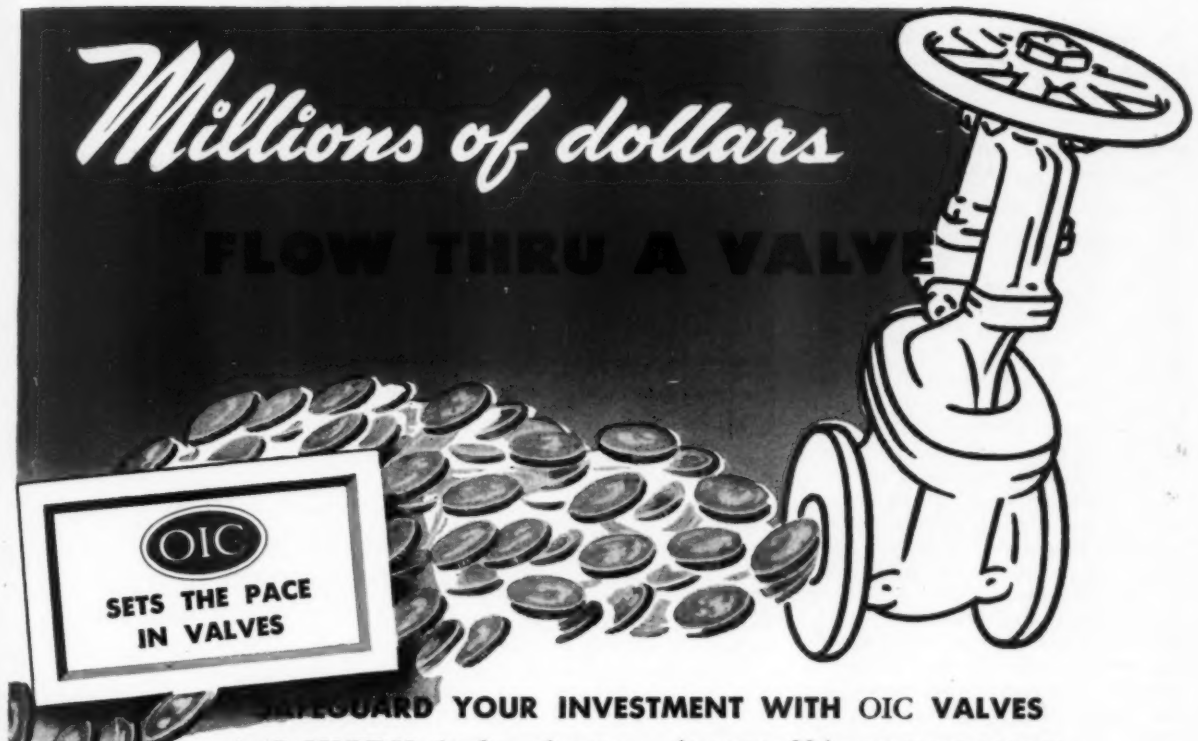
## ST. REGIS COMPANY OPENS PANELYTE SALES OFFICE IN MINNEAPOLIS DISTRICT

The opening of a new Panelyte district sales office in Minneapolis has been announced by the St. Regis Paper Company, New York City. District manager will be Herbert M. Giefer, who was associated for several years with C. E. Gobeil Company, St. Paul, former sales agents for Panelyte.

Announcement also has been made of the appointment of Jann P. Nielsen as a Panelyte representative in the Detroit district. Mr. Nielsen formerly

# *Millions of dollars*

FLOW THRU A VALVE

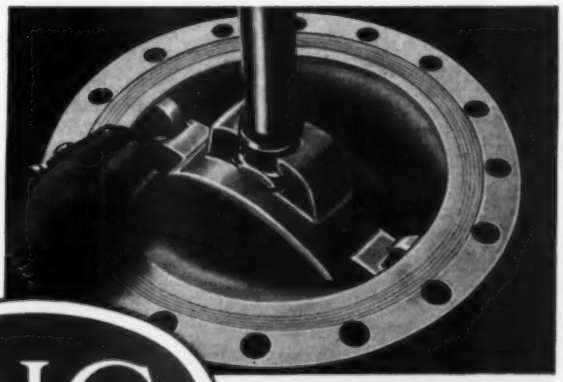



## SAFEGUARD YOUR INVESTMENT WITH OIC VALVES

TO CONTROL the flow of steam, water, oil or gas that keep your industry running, play safe with OIC valves. Your engineer will verify that OIC provides the last word in design . . . often goes *beyond* the regular strength and quality specifications. Purchasing agents find that advanced production methods in the "model" OIC plant provide a lot of valve for the money. Maintenance men approve of exclusive OIC features such as the *patented* gland and gland flange that provides unobstructed access to the stuffing box . . . extra-long bushings that reduce thread wear . . . the special condensation chamber that protects *all* the packing in high-temperature steel valve service. It *pays* to invest in the best in valves, the pace-setter is OIC!

## PRECISION-SLOTTING IN OIC VALVES PREVENTS LOOSE PARTS

OIC gate valves live a long, useful life because they're not worn out by continual scraping of wedge faces . . . everlasting "chatter." All OIC gate valve wedges are "precision-slotted." Accurate guides in the body provide an exact track for the slot to slide on as the wedge raises and lowers. This prevents extra wear on the smooth-finished wedge face. It also assures efficient operation when the valve is installed sideways. It's another OIC "plus" . . . another reason why OIC *continues* to Set The Pace In Valves!



OIC VALVES

STEEL • IRON • BRONZE

was associated with Woodall Industries, Camfield Manufacturing Company, and Capac Plastics, Inc.

◆

## NEW PLANT COMPLETED BY BOSTON CORRUGATED BOX DIV. OF ROBERT GAIR CO.

A million dollar plant has been completed in Cambridge, Massachusetts, for the Boston Corrugated Box Division, a unit of the Robert Gair Company, Inc., New York. This is the sixth plant occupied by the Boston Division since the inception of its predecessor company forty years ago, each move having been forced by the need for larger manufacturing space.

The Cambridge factory is of one story construction, except the front which is two stories high to house the shipping floor and the office. The main manufacturing room is 180 feet by 500 feet, and the total manufacturing area is approximately 150,000 square feet. The plant was designed and erected under the supervision of John E. A. Warner, chief engineer of the Robert Gair Company, and his staff. The plant is under the local direction of Gordon W. Olsen, division manager; Frank E. Newton, sales manager; and Hubert D. Sewell, superintendent.

The building of the Cambridge plant is part of a Gair program which included the recent installation of a million dollar fourdrinier machine at its Thames River Division, and a seventeen million dollar forestry and mill project in Georgia which is to be completed early in 1948.

◆

## NEWSPRINT INVESTIGATION SHOWS LITTLE PROGRESS

The New York Grand Jury investigation into charges that there is a violation of the antitrust laws in the sale of newsprint has proceeded at a slow pace. Subpoenas for representatives of Canadian mills have been withdrawn by the United States Attorney General. Canada had balked at this effort to extend the antitrust laws into Canadian mill operations, and the subpoenas were finally withdrawn after conferences between Canadian and American government officials. Mr. Clark, however, says he has secured the information he desired through conferences at Ottawa.

Meanwhile, rumors are prevalent that there will be a further increase in newsprint prices after the first of the year, the increase being variously forecasted as $8 or $10 per ton.

Meanwhile the efforts to establish new mills in Canada are deferred pending the receipt of bids in February for prospective builders. The United States Forest Service may go into the courts to block plans of the Alaska Indian villages to sell $20,000,000 worth of timber, principally pulpwood grades, to the Timber Development Corporation of New York. This planned purchase would involve timber which the Forest Service says is not the possession of the Indians.

*New million-dollar plant built in Cambridge, Mass., for the Boston Corrugated Box Division of the Robert Gair Co.*

◆

## BIDDING AND AUCTION TIME EXTENDED ON SALE OF FOREST LAND IN KETCHIKAN, ALASKA

Time to qualify for bidding, and the auction date for the sale of 1,500,000 cu. ft. of national forest timber in the vicinity of Ketchikan, Alaska, hav been extended, according to an announcement December 1, by the Forest Service of the U. S. Department of Agriculture. (Cf. P.I. and P.W. Oct. 1947, p. 934.)

Under the revised schedule, parties who desire to qualify for bidding may submit statements to Lyle F. Watts, chief of the Forest Service, on or before March 1, 1948. Applicants will be advised as to whether they qualify on or before March 29, 1948. The oral auction will be held in the chief forester's office, Washington, D. C., beginning at 2:00 P.M., April 14, 1948.

All other terms and conditions of the proposed sale, which was originally announced on September 12, remain unchanged.

Forest Service officials state that the postponement will permit parties who already have expressed a desire to bid to clarify their qualifications.

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▶▶▶ ALL OPERATIONS involving manufacture and sale of International Paper Company's heavy-duty multiwall kraft paper bags will be carried on in the newly formed Bagpak Division, according to John H. Hinman, president. Previously these operations were handled by two subsidiary companies, George and Sherrard Paper Company and Bagpak, Inc., which have been dissolved, and by the company's former International Paper Products Division.

◆

▶▶▶ RAPID EXPANSION of the faculty and student body of The New York State College of Forestry at Syracuse University is shown in a statement issued by Dean Joseph S. Illick. The total of 866 students now taking the forestry courses is 333 more than the highest prewar enrollment. Graduate student registration has increased from 4 in 1944 to a present enrollment of 66. The faculty has been increased from 39 in 1937 to 59 this semester.

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## COMIC MAGAZINE PUBLISHER BUYS POTSDAM PAPER MILLS

The Fox Feature Syndicate, Inc., of New York City, headed by Victor S. Fox, comic magazine publisher, has purchased the Potsdam Paper Mills at Potsdam, New York.

Roland I. Mead, formerly with the American Industrial Company as consulting engineer, has been named manager of the mill. Additional machinery and equipment are being installed to increase the mill's capacity.

◆

▶▶▶ PURCHASE OF more than 2,000,000,000 feet of timber, 125 miles of logging railroad, and other holdings and equipment of the Polson Logging Company (Hoquaim, Wash.) has been made by Rayonier, Inc., Shelton, Washington. Included in the transaction are more than 50,000 acres of virgin timber and 70,000,000 acres of reproduction lands. The purchase price was not revealed, but Edward Bartsch, president of Rayonier, said the company's total indebtedness has been combined in one long term obligation of $20,000,000.

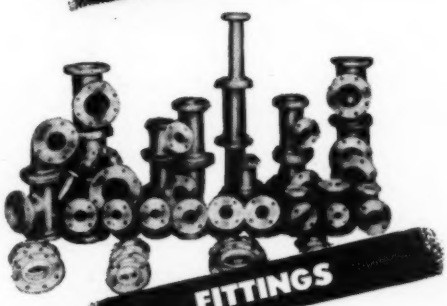
# RESIST

## CORROSION · ABRASION · HEAT

## *in the Paper Mill*

## with COOPER STAINLESS STEEL · · ·

CASTINGS



FITTINGS

CENTRIFUGAL PIPE

COOPER'S 25 Years of close association with the Paper Industry and its intimate knowledge of the problems peculiar to that industry . . . plus vast technical experience combined with practical shop skill has resulted in COOPER'S unusual ability to produce sound corrosion resisting Stainless Steel castings, fittings and centrifugal pipe specifically designed to resist corrosion, abrasion and heat in the Paper Mill.

Each step in the production of COOPER Stainless Steel products is fully controlled . . . for all facilities and services at COOPER are located under one roof making The Cooper Alloy Foundry Co. the largest of its kind in the country.

THE COOPER ALLOY FOUNDRY CO.

HILLSIDE, NEW JERSEY

# BRIEFS

▶▶▶ AFTER PURCHASING a site in Chatham, Ontario, Hinde and Dauch Company is now receiving bids for the erection of a new plant. The new million dollar unit will be of one-story brick construction and will cover approximately 100,000 square feet. It is expected the plant will be in operation in a year and will employ about 150 workers.

◆

▶▶▶ MORE THAN EIGHTY employees of the Brown Company (Berlin, N. H.) have enrolled in the night school being conducted at Berlin High School as part of the adult education program. Most popular course is stenography and secretarial work, and a close second is elementary blueprint reading.

◆

▶▶▶ PREPAYMENT OF the remaining $5,000,000 of the unsecured 25 per cent notes of the International Paper Company, New York, has been authorized by the board of directors. This will leave International and its subsidiaries entirely free of interest bearing debt for the first time since the company was organized in 1898. After this payment, the capital structure of the company will consist solely of $23,000,000 of $4 preferred stock and 3,560,000 shares of common stock.

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▶▶▶ AN OFFICIAL START was given the New Hampshire Forestry Pulpwood contest on October 31 when thirty-seven representatives of the pulp and paper industry, landowners, operators and county foresters were entertained by the Marcalus company at Lincoln, New Hampshire. Plans were made for the contest which will last through the winter for landowners in the three northern counties of the state—Carroll, Coos, and Grafton.

■

▶▶▶ INDUSTRIAL RELATIONS conferences will be held in six parts of the United States early next year by the United States Chamber of Commerce. They are scheduled for Atlanta, February 2 and 3; Minneapolis, February 19 and 20; Los Angeles, February 26 and 27; Fort Worth, March 4 and 5; New York City, March 11 and 12; and Chicago, March 18 and 19. Subjects to be discussed include the Taft-Hartley law, wage-price-profit trends, new legislative issues, and problems in contract negotiations.

◆

▶▶▶ A PULP PLANT, operating largely on timber waste from logging operations, will be built at Duncan Bay, near the $10,000,000 power development site at Campbell River, B. C. Lands Minister Kenney, of the Province of British Columbia, made this announcement on November 29. He further stated that the plant will be built by the Canadian Western Timber Company and Associates, headed by R. J. Filberg, of Victoria, British Columbia. Details of the plant have not been announced.

◆

▶▶▶ A NEW NURSERY will be established by the Georgia State Forestry Department where the Herty Nursery is located. The announcement was made by Governor M. E. Thompson at a meeting of about seven hundred farm, business, industrial, civic and government leaders who assembled in Atlanta to launch a "Keep Georgia Green" movement, designed to prevent forest fires and to grow more trees. The new nursery will bring the total production of seedlings up to about 45,000,000 a year which is nearly double the present figure.

▶▶▶ THE WARTIME ADDITION to the plant of Economy Pumps, Inc., Hamilton, Ohio, has been acquired by the company from the War Assets Corporation. The addition was built in 1942 by the Defense Plant Corporation at a cost of $705,000 to house an Economy subsidiary, Liberty Planers, Inc. The new building contains 100,000 square feet in five parallel crane bays, served by 30-, 15-, 5- and 3-ton cranes. The new plant will house both Economy's subsidiaries, Liberty Planers, Inc. and Klipfel Mfg. Company.

◆

▶▶▶ NATAL, SOUTH AFRICA, was the destination of a recent shipment of a five-wall, flat bag tubing machine and two bottoming machines made by Smith & Winchester Mfg. Company (South Windham, Conn.). The machines are to be used in making multi-wall, pasted bottom, bags for cement, fertilizer, and other chemicals. Representatives of the South African firm visited the Smith & Winchester plant to inspect the machines under operating conditions before shipment.

◆

▶▶▶ NEARLY FIFTY PROMOTIONS have been made in the personnel of the paper mill and beater room of Hammermill Paper Company (Erie, Pa.) as a result of installation of a new $2,000,000 papermaking machine. Erection of the large fourdrinier machine is part of the company's $7,000,000 postwar expansion program. Twenty-five new jobs are also being created by installation of the new machine.

◆

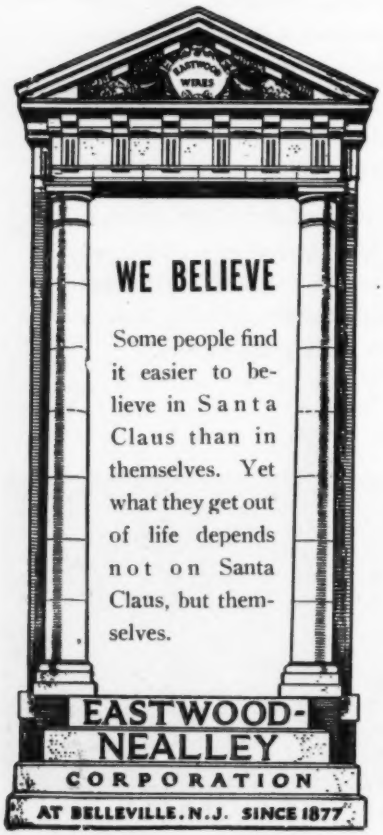
▶▶▶ COLOMBIA'S NEEDS for paperboard, corrugated boxes, and folding cartons will be supplied by a new $1,500,000 paper mill and box factory to be built at Cali, Colombia. Half-owned by a large American container company, the plant will employ 150 people.

◆

▶▶▶ A COURSE ON WAXES is being given by L. Invanovsky at Chelsea Polytechnic, London, starting January 16. The series of eight lectures on the modern chemistry and technology of waxes is designed to meet the demands of postgraduate students, research workers, and industrial chemists.

◆

▶▶▶ PRELIMINARY WORK for a new warehouse, office building, and housing has been started at Bolbeau, Quebec, by Lake St. John Power and Paper Company. Total cost of the new buildings will be about $200,000.



EASTWOOD WIRES
WE BELIEVE
Some people find it easier to believe in Santa Claus than in themselves. Yet what they get out of life depends not on Santa Claus, but themselves.
EASTWOOD-NEALLEY
CORPORATION
AT BELLEVILLE, N.J. SINCE 1877

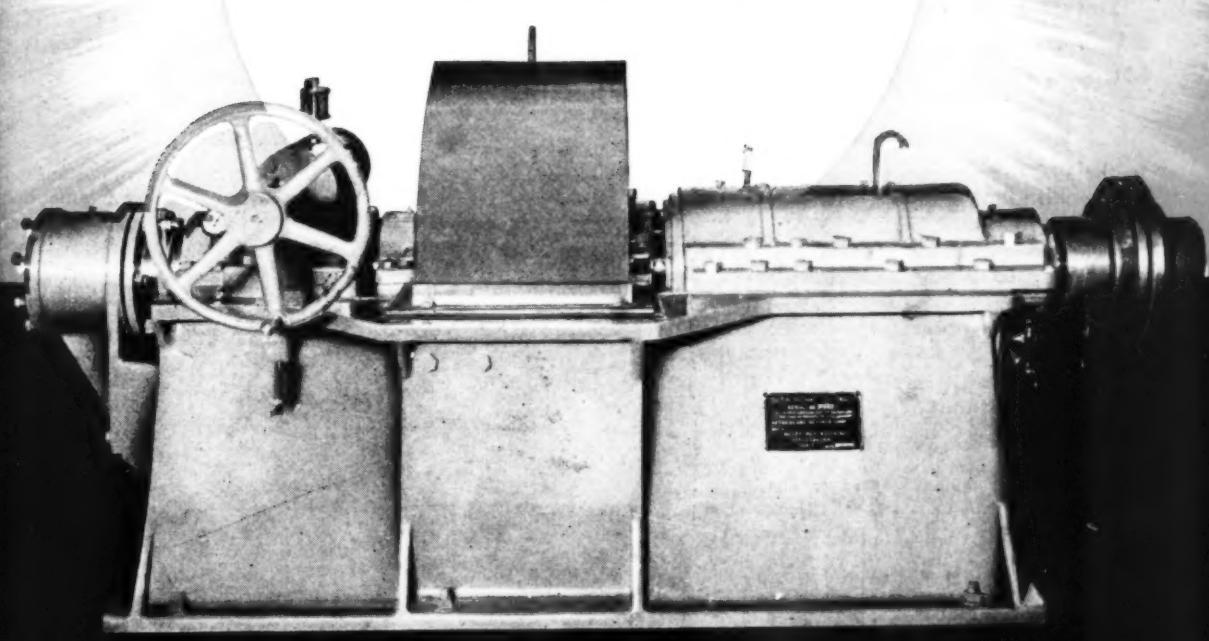
# Machines of Lower Tonnage

## (FOURDRINIER AND CYLINDER)

*use*

# 32"

# *Sutherland*



*Sutherland* CONTINUOUS *Beating and Refining System*

**SUTHERLAND REFINER CORPORATION**

TRENTON, NEW JERSEY · *Manufactured in the United States by Valley Iron Works Co., Appleton, Wis.*

SUTHERLAND REFINER LIMITED, 319 DRUMMOND BLDG., MONTREAL, P.Q., *Manufactured in Canada By The John Bertram & Sons Co. Ltd., Dundas, Ontario*

# How 19,000 companies up take-home pay *without upping payrolls*

**Can you deduct $18.75 from $60.00 and get $66.25? *Yes.* And the way you can do it is mighty important to your company—and to the nation!**

**You start with $60, representing someone's weekly take-home pay. You deduct $18.75 for the purchase of a U.S. Savings Bond. That leaves $41.25. But $41.25 isn't what the worker takes home. He takes home $41.25 *plus a $25 Savings Bond.* Total (assuming he holds the Bond till maturity): *$66.25.***

### WHAT 19,000 COMPANIES HAVE LEARNED

In the 19,000 companies that are operating the Payroll Savings Plan for the regular purchase of Savings Bonds, employees have been more contented in their jobs—absenteeism has decreased—even accidents have been fewer!

Those are the "company" benefits the Plan provides, in addition to extra security for individual employees.

But the Plan has other, far-reaching benefits of basic importance to both your business and the national economy...

### SPREADING THE NATIONAL DEBT HELPS SECURE YOUR FUTURE

The future of your business is closely dependent upon the future economy of your country. To a major extent, that future depends upon management of the public debt. Distribution of the debt as widely as possible among the people of the nation will result in the greatest good for all.

How that works is clearly and briefly described in the free brochure shown at the right. Request your copy—*today*—from your State Director of the U. S. Treasury Department's Savings Bonds Division.

### ACTION BY TOP MANAGEMENT NEEDED

The benefits of regular Bond-buying are as important today as ever—but war-time emotional appeals are gone. Sponsorship of the Payroll Savings Plan by a responsible executive in your company is necessary to keep its benefits *advertised to your employees.*

Banks don't sell Savings Bonds on the "installment plan"—which is the way most workers prefer to buy them. *Such workers want and need the Payroll Savings Plan.*

Those are the reasons why it's important to make sure that the Plan is adequately maintained in your company.

The State Director will gladly give you any assistance you wish.

**"The National Debt and You,"**

*a 12-page pocket-size brochure, expresses the views of W. Randolph Burgess, Vice Chairman of the Board of the National City Bank of New York—and of Clarence Francis, Chairman of the Board, General Foods Corporation. Be sure to get your copy from the Treasury Department's State Director, Savings Bonds Division.*

---

*The Treasury Department acknowledges with appreciation the publication of this message by*

## The Paper Industry and Paper World

*This is an official U.S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council*

# RESEARCH

## To make it

## *Better and Better and Better*

A great new research program, designed to develop products that will be of ever-increasing service and value to you is now under way. Whatever your requirements for standard or special formulas, our technical and sales staff is always available to assist you.

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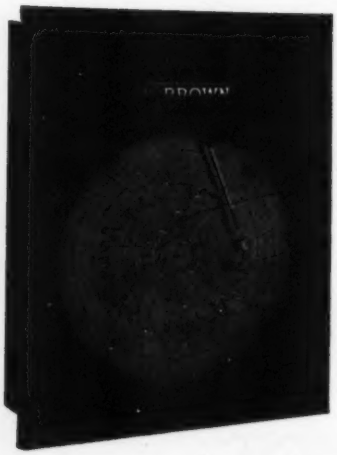
CORN PRODUCTS DEPARTMENT

**ANHEUSER-BUSCH, INC.**

ST. LOUIS, MO.

# Complete Cost Accounting Must Include Steam




Brown Electric Recording and Integrating Flow Meter

**If steam were a raw material, every plant would make precise accounting of its consumption.**

**Steam is costly. It is often wasted. Departments draw far more steam than needed for efficient operations because it is "free."**

**Many plants have installed the Brown Steam Accounting System and realized substantial savings. Steam wastes are detected. Consumption is lowered and savings quickly repay the small investment.**

**Hub of the Steam Accounting System is the Brown Recording and Integrating Flow Meter. The exclusive features of this instrument tell you where steam goes, when it goes, and how much goes. It is then easy to figure costs for any department or process.**

**With rising fuel costs, now is the time to save steam. Write for information about the Brown Steam Accounting System.**

**THE BROWN INSTRUMENT COMPANY, 4489 WAYNE AVE., PHILADELPHIA 44, PA.**
**DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY**
SUBSIDIARY COMPANIES IN TORONTO • MEXICO CITY • LONDON
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## BROWN INSTRUMENTS

AND MINNEAPOLIS-HONEYWELL CONTROL SYSTEMS

***For Temperatures . . . . . Pressures . . . . . Flows . . . . . Liquid Levels***

GENTLE AS AIR ITSELF

# There's only one *pneumatic* tension

## ..."Gentle as air itself"... to control feeding paper from rolls

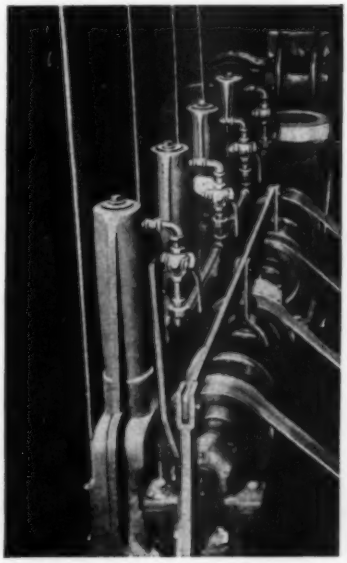
In paper coating and converting—nothing matches AIR—for soft, resilient, instant-acting pressure. Positive AIR pressure controls every foot of the unwinding web, when your reels are fitted with Wood *Pneumatic* Tensions. Constant, unvarying tension, at any desired speed, becomes fully automatic... and production, therefore, far more uniform. Wood Reels and Autopasters (for full-speed automatic splicing), complete a balanced paper-feeding system. Write for illustrated brochures and comparative data to fit your needs.

Wood Newspaper Machinery Corporation, Plainfield, N. J.
Executive Offices: 501 Fifth Avenue, New York 17, N. Y.

Wood
NEWSPAPER
MACHINERY

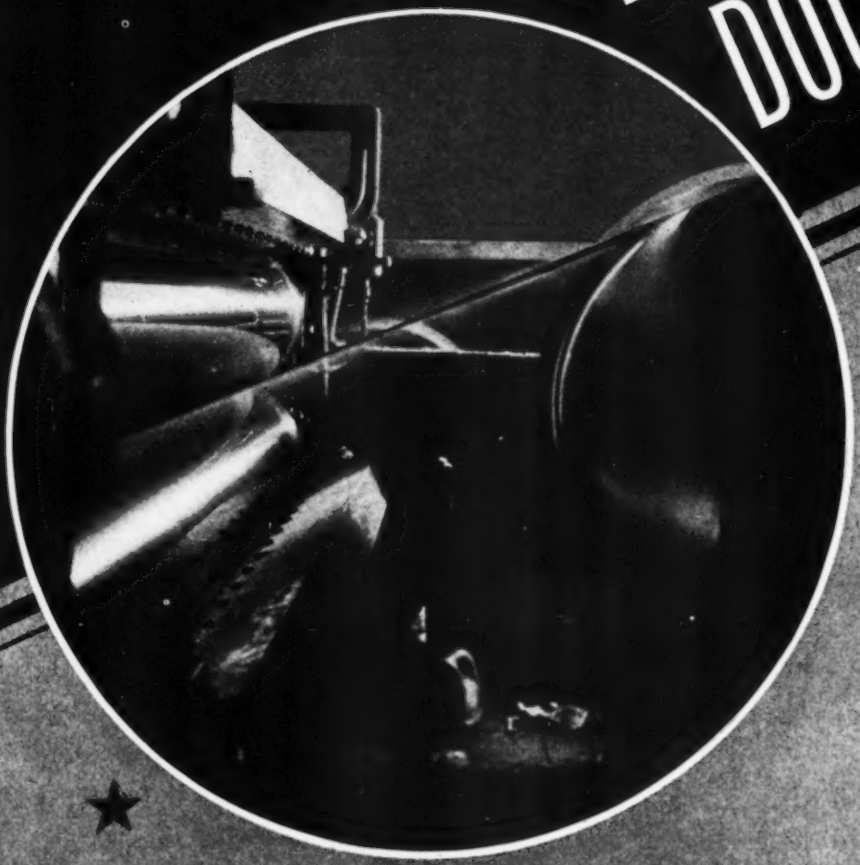
*pneumatic*

**running-belt tensions for paper coating, finishing, and converting**



Each air-piston acts independently...each belt tension adjusts instantly to compensate for variations in the web itself. The entire system acts as a powerful "brake," whenever you need to use the Red Button Stop.

# LODDING DOCTORS



Wherever a good doctor is needed . . Lodding Engineering Corporation. Worcester, Mass. Represented outside New England by W. E. Greene Corporation. Woolworth Building, New York.

★ Breaker rolls

## WE HAVE AN UNDERSTANDING OF FELT

## THAT WE CONVERT INTO **LOWER**

## OPERATING COSTS FOR YOU

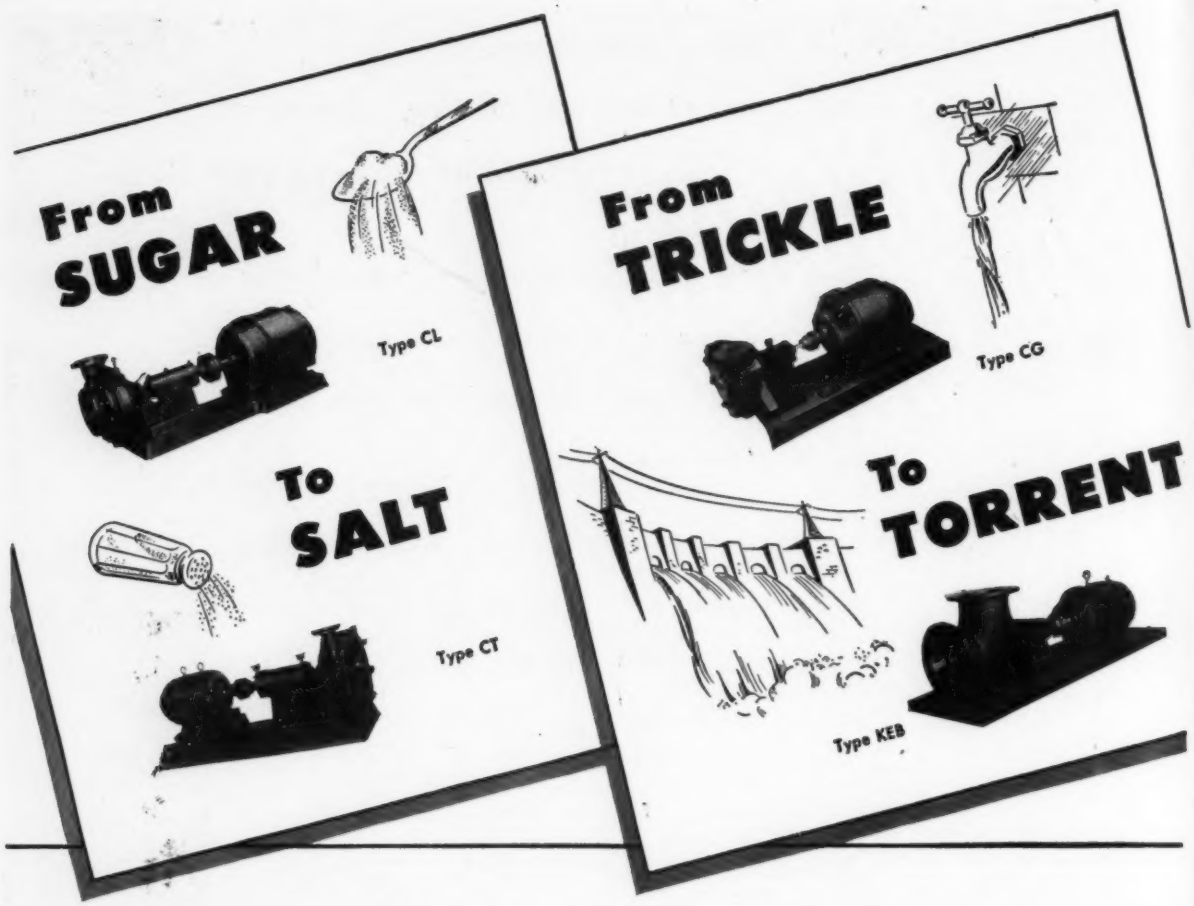
TENAX
"TENAX FELTS ARE TOUGH"

There is little that is secret about the manufacture of felt for paper making. It is rather a matter of experience and craftsmanship; the use of the finest virgin wools; the expertness of weavers and carders.

Here at Lockport where we have been making felt for leading paper makers for 56 years we have experience in abundance; craftsmanship of the highest order; the ability and the judgment in buying the wools that give the best felting qualities.

Our felts—**TENAX FELTS**—are the product of all this accumulated experience and this father-to-son craftsmanship. They are made to serve you and serve you well; to help you produce more at less cost; to keep your mills and machines running for longer periods at a more profitable rate. Our field men are at your service as is our plant and all its people. We invite your inquiries.

**LOCKPORT FELT COMPANY**
**NEWFANE, N. Y.**
SERVING THE PAPER INDUSTRY SINCE 1891




## *Worthington Standard Centrifugal Pumps serve all processing industries*

Whether your pumping problems involve corrosion, abrasion or contamination, or are strictly hydraulic, you'll find efficient, economical, *ready-made* answers in Worthington Centrifugal Pumps.

**"Across the Board" in Chemicals**

Worthington Worthite Pumps, for example, are something extra-special in stainless steel alloys. Developed to handle the widest range of pump-punishing liquids, they are equally resistant to corrosive, low pH sugar syrups and corrosive-abrasive brine slurries at the boiling point.

**As for Capacities . . .**

Worthington Centrifugal Pumps deliver from 5 to 18,000 gpm, smoothly and steadily at all usual heads and speeds. In short, to all industrial processing—from paper to plastics, from rayon to rubber—Worthington offers more pumps for more jobs, plus the longest experience in the field. For details proving *there's more worth in Worthington*, contact our nearest District Office or *Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.*

MEMBER

# WORTHINGTON

C7-7

THE WORLD'S LARGEST MANUFACTURER OF PUMPS

Types CG and CGL. Sizes ½" to 10". Capacities to 5000 GPM; heads to 200 ft. Liquid ends of WORTHITE alloy.

Type CF. Sizes 1" to 4". Capacities to 1000 GPM; heads to 130 ft. Standard, all iron and all bronze.

Type CG. Sizes 1½" to 3". Capacities to 600 GPM; heads to 130 ft. at 1750 RPM. Closed impeller. WORTHITE

Type L. Sizes 3" to 8". Capacities to 2250 GPM; heads to 300 ft. Single stage volute. For general service.

# *One Truck* ...25 BODIES... 21 CUBIC YARDS EACH...

## ..ANOTHER DEMPSTER DEVELOPMENT IN LOW COST MATERIALS HANDLING...

Dempster Engineers developed the Dempster-Dumpster Type "ARLF" to meet a manufacturer's problem in handling large quantities of bulky, cumbersome loads in an efficient and economical manner. Adaptability to the widest variety of materials and uses soon gained general acceptance for the "ARLF" and today it is providing efficient materials handling in some of the nation's leading industrial plants.

Looking at the installation illustrated on this page, it is easy to visualize the tremendous savings in payroll, maintenance and operational expense that result when one man and one truck handles 25 bodies, each having a capacity of 21 cubic yards.

At left, the four pictures, from top to bottom, show how the truck hoisting unit handles a body. First: Truck Hoisting Unit prepares to pick up body. Second: Operated from controls in the truck cab, the hydraulic hoisting unit lifts the load vertically. Note how the automatic hydraulic stabilizing jacks provide perfect balance for the load. Third: Load moves forward to carrying position on the truck for hauling. Fourth: At destination, body is dumped by tilting, or load can be lowered to the ground without being dumped.

Dempster-Dumpster bodies of capacities from 1½ to 21 cubic yards are made in the form of tanks, racks and open or closed for use with every type of material whether it be gas, liquid or solid. So regardless of the type or size of material you handle, it will pay you to investigate the Dempster-Dumpster System. A letter from you will bring illustrated literature and full information on this remarkable system of materials handling.

**DEMPSTER DUMPSTER**

TRADE MARK REG.

**DEMPSTER BROTHERS, Inc.**

9127 SPRINGDALE KNOXVILLE 17, TENNESSEE

STANDARD
APPLETON
FELTS.
AMERICAN WOOL
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AMERICAN F.E.L.T.S.
APPLETON, WIS.
make
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paper
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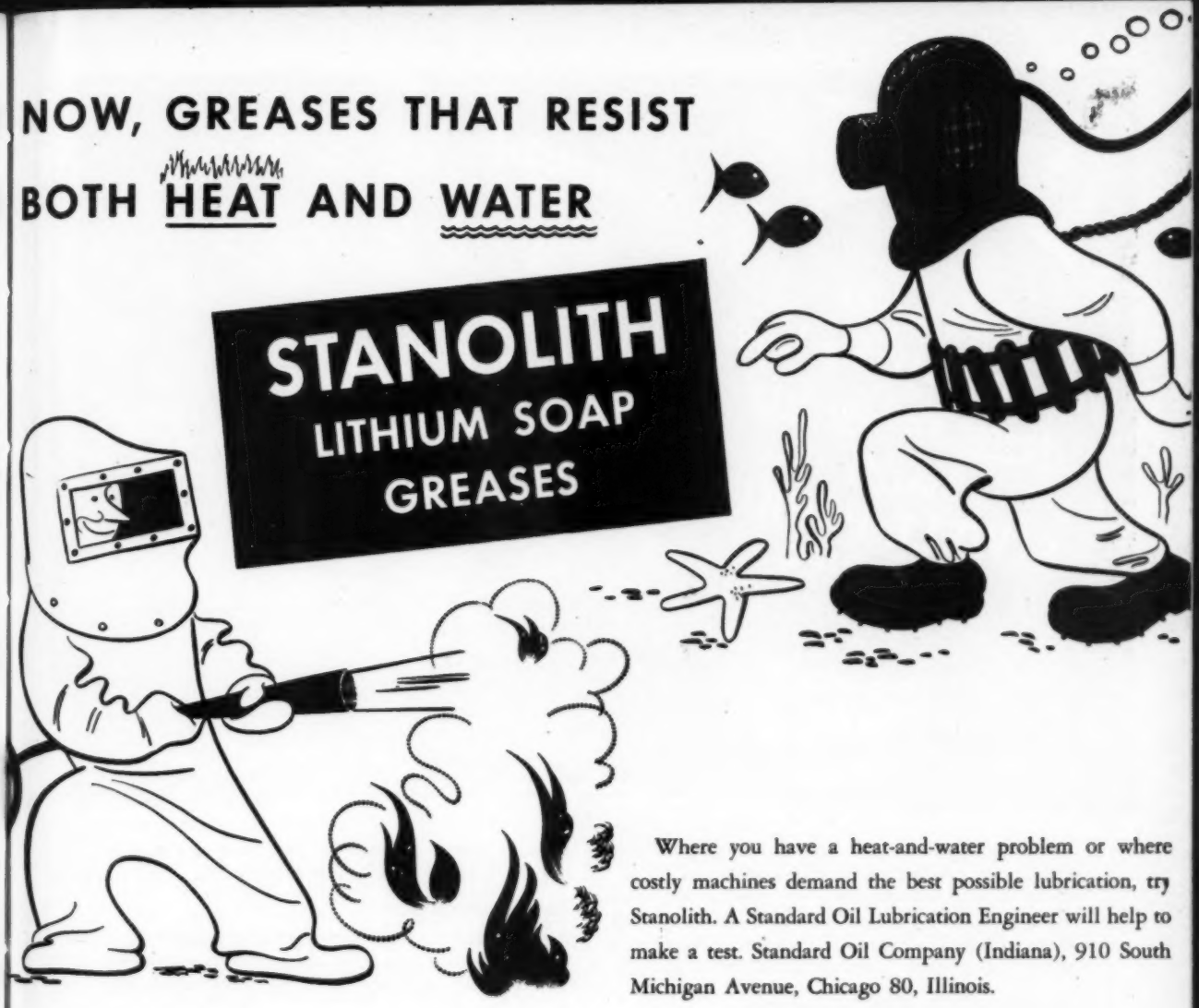
# NOW, GREASES THAT RESIST BOTH HEAT AND WATER




WERE YOU ever faced with the problem of lubricating bearings which operated under extremely wet conditions and, at the same time, were subjected to widely varying temperatures? If so, you probably had to choose between a high-temperature grease with poor resistance to water or a water-resistant lubricant with only fair resistance to heat.

Standard Oil's new Stanolith greases end all need for compromise. A lithium soap grease has unusual characteristics which conventional soda soap or lime soap greases cannot duplicate. Stanolith greases resist the washing action of water because they are insoluble in water and also are extremely adhesive. They resist heat because they are made from an extremely stable base oil and a high-melting point soap, and contain an oxidation inhibitor.

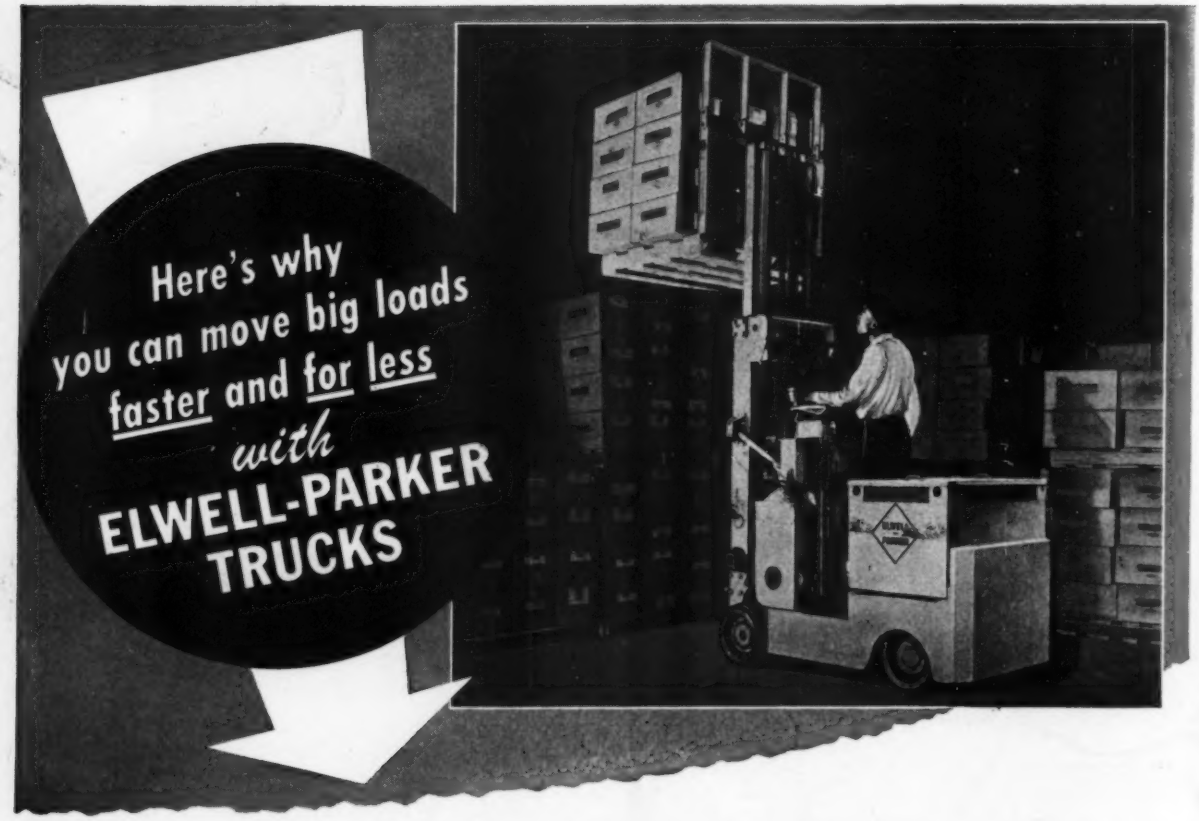
Where you have a heat-and-water problem or where costly machines demand the best possible lubrication, try Stanolith. A Standard Oil Lubrication Engineer will help to make a test. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

### Performance Characteristics of Stanolith Greases

- operate over a wide range of temperatures—have high dropping points.
- have excellent water resistance.
- have unusual mechanical stability—a minimum of oil evaporation and separation.
- contain effective oxidation inhibitors.
- are corrosion resistant.

Two grades of Stanolith Greases are available: No. 42—with a No. 1 consistency, and No. 57—with a No. 2 consistency.

**STANDARD OIL COMPANY (INDIANA)** STANDARD SERVICE




Elwell-Parker does not supply arbitrary "standard" model trucks; instead E-P engineers "tailor" them to the warehousing or production conditions of the individual user. However, all Elwell-Parker Trucks include these features that insure years and years of satisfactory service:

### Positive "On-Off" Controls

Truck cannot move unless operator stands on both pedals Likewise it stops when the driver steps off the pedals, because the brakes are applied and the power is instantly shut off.

### Easy Handling

By reducing operator fatigue, insures careful driving. Operators are always alert because E-P trucks have cushioned pedals, easy steering, controlled speed and smooth, quiet operation.

### Original, Proven Braking

The brake action is fast—soft yet positive. Brakes can be applied when power is on, so that starting or stopping on ramps is easy and safe.

### Safe Driver Position

On both end and center control models, driver can quickly dismount in case of emergency. On center control models the operator can readily get on or off from either side of truck.

### Super Strength

Entire truck is of rugged, "tank-tough" construction, using special steels that are riveted and welded together for long term durability.

### Extra Power From Motors

They are Elwell-Parker built Class B motors having glass and asbestos insulation—more costly and worth it. Thus the "heart" of every truck is liberally designed to take *all* the battery power.

### PLUS
### Indispensable Engineering Knowledge

As the pioneer and leader in the field of industrial trucks, Elwell-Parker has unique experience regarding the proper application of industrial power trucks to specific needs.

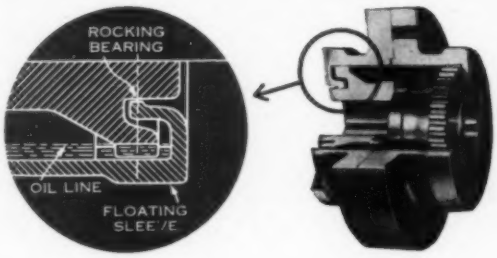
For actual demonstration of these truck features and helpful advice on *your* materials handling problem, call in the nearest E-P man.

Ask for our handbook, "Industrial Logistics", a treatise on materials handling and distribution. The Elwell-Parker Electric Company, 4241 St. Clair Avenue, Cleveland 14, Ohio.

# ELWELL-PARKER

Established 1893

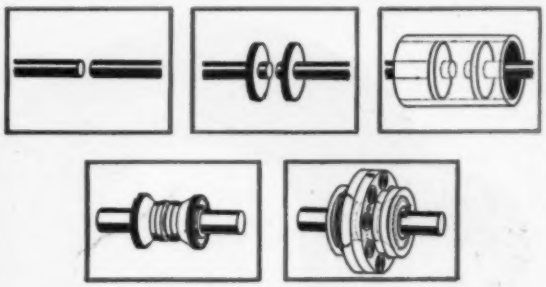
**POWER INDUSTRIAL TRUCKS**




### HERE'S HOW FAST'S Gives Extra Protection!

No matter which type of Fast's Coupling you use, you can be sure of this . . . it will have the exclusive "rocking bearing," shown above, for extra protection against shutdowns. This feature provides a positive metal-to-metal seal to protect the load-carrying oil against moisture, dust and grit. It means there's nothing to wear, nothing to fail, in this vital part of your couplings.

1

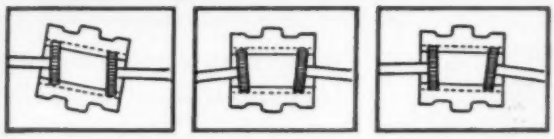


### HERE'S HOW FAST'S Are Constructed—Simple as A-B-C!

See the simple development of Fast's self-aligning Couplings. A splined hub on each shaft end. A sleeve with internal splines to mesh. Oil in the sleeve, kept between the splines by centrifugal force, carries the load between the splines.

2

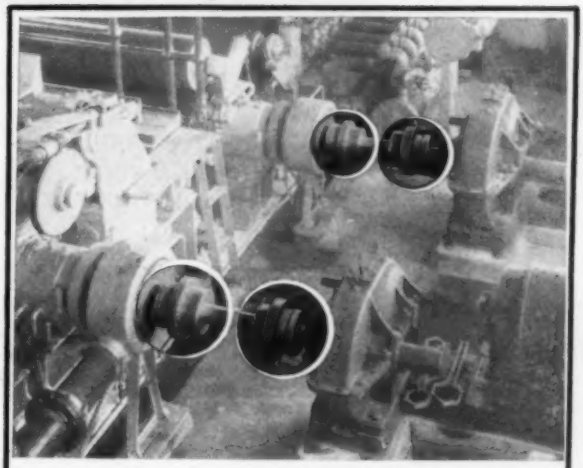
# These Facts About the ORIGINAL Gear-Type Coupling *Can Save You Costly Coupling Shutdowns*



### HERE'S HOW FAST'S COUPLINGS Compensate for Misalignment!

The floating sleeve takes a neutral position. All forms of misalignment are compensated for between the lubricated faces of the splines, equally divided between the driving and driven members. The entire assembly revolves as one unit.

3



### HERE'S HOW FAST'S COUPLINGS ARE USED

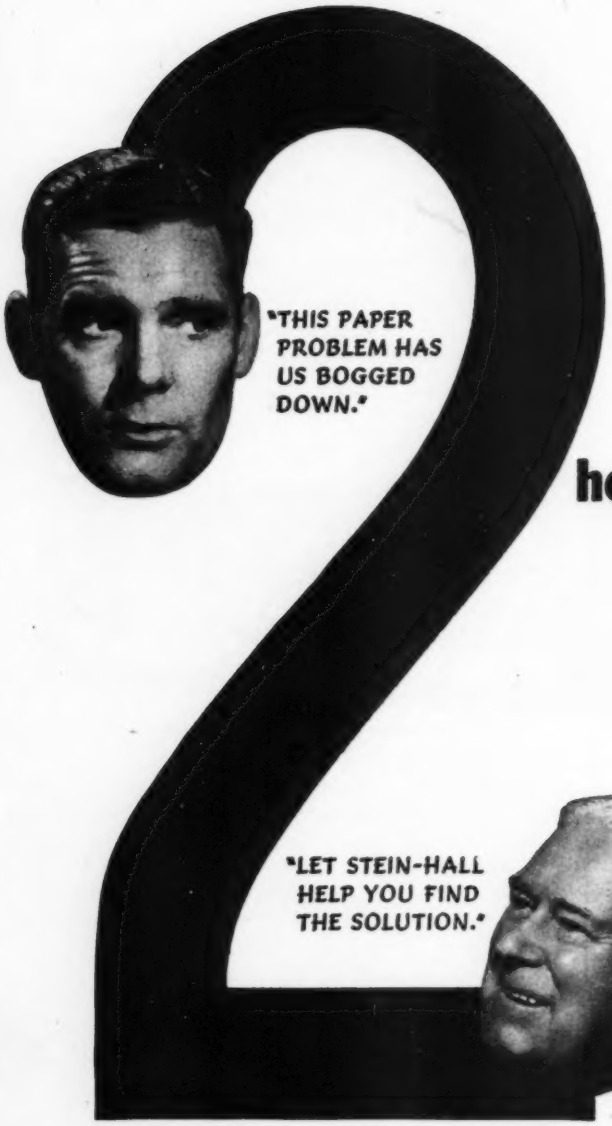
These Fast's Floating Shaft Couplings have seen service since 1931 in the bleached sulphite pulp mill of the Weyerhaeuser Timber Co., Longview, Wash. . . . a good example of the way Fast's Couplings give uninterrupted power transmission. When you buy Fast's Couplings you buy many years of top engineering experience, Koppers' high standard of workmanship and unexcelled coupling service. Result: longer machine life, lower upkeep costs, minimum shutdown losses.

4

**WE HAVE** *a complete line of couplings for immediate delivery. Get full details on Fast's Couplings now by writing for our complete catalog. Just drop a line to:* Koppers Co., Inc., Fast's Coupling Dept., 332 Scott St., Baltimore 3, Md.

KOPPERS

# FAST'S *self-aligning* COUPLINGS




# heads are better than 1

Getting together with Stein-Hall on a paper production problem has saved time-and-money for many a paper plant. You can do the same. Just ask—and all the technical experience of your near-by Stein-Hall salesman—plus the services of our complete laboratories—will be placed willingly at your command. We are anxious as you to see you get the most out of Stein-Hall products. So whenever any difficulty or special requirement in your production comes up—large or small—don't let it get you down. Call in Stein-Hall right away.

**HALLMARK QUALITY PRODUCTS FOR THE PAPER INDUSTRY**

| | | |
|---|---|---|
| Corn Starches | Tapioca Flours | Beater Sizes |
| Calender Sizes | Tub Sizes | Coating Gums |
| Envelope Gums | Paper Bag Pastes | Corrugating Adhesives |

**LABORATORY-CONTROLLED FOR UNIFORMITY**

**STEIN SH HALL**

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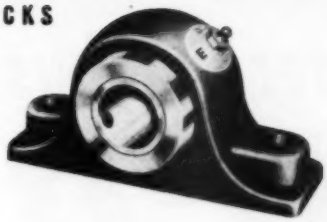
**285 MADISON AVENUE NEW YORK 17, N. Y.**

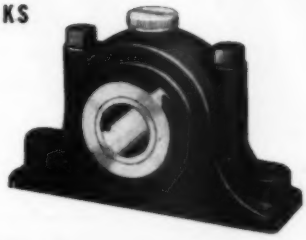
Branch Offices in 16 Other Cities and Canada (See your local phone directory)

**DODGE-TIMKEN TYPE "E" PILLOW BLOCKS**



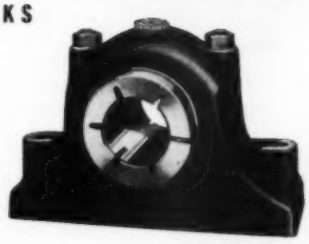
Superior performance at moderate cost. High speed capacity. Sizes 1-3/16" to 4".

**DODGE-TIMKEN DOUBLE INTER-LOCK PILLOW BLOCKS**



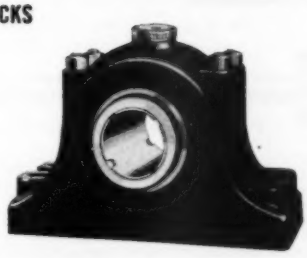
For general service. Normal radial, thrust and shock loads. 1-7/16" to 4-15/16".

**DODGE-TIMKEN TYPE "C" PILLOW BLOCKS**



Triple sealed against fine abrasive dust. Shaft sizes are 1-3/16" to 4-15/16".

**DODGE-TIMKEN SPECIAL DUTY BALL AND SOCKET PILLOW BLOCKS**



Rugged, heavy duty, high speeds. Made in shaft sizes from 1-7/16" to 8".

*For Unquestioned Quality—*

# DODGE-TIMKEN

On anti-friction bearings, these two names are assurance of dependability and performance which enable you to cut costs and increase production. Dodge mounts, seals and houses the precision bearing assemblies and delivers them fully assembled, adjusted and lubricated—ready to lock on the shaft. Parts required for mounting these bearings are manufactured complete in the Dodge factory—from foundry through many precision operations on the latest machine tool equipment. The bearings pictured are from the famous Dodge 30,000 hour line, covering a broad range of industrial bearing requirements, promptly available from distributors' stocks.

**DODGE MANUFACTURING CORPORATION • MISHAWAKA, INDIANA**

***CALL THE TRANSMISSIONEER***

your local Dodge distributor, for news of latest developments in power transmission equipment. Look for his name in your classified telephone book under "Power Transmission Equipment."

**DODGE**

*of Mishawaka, Ind.*

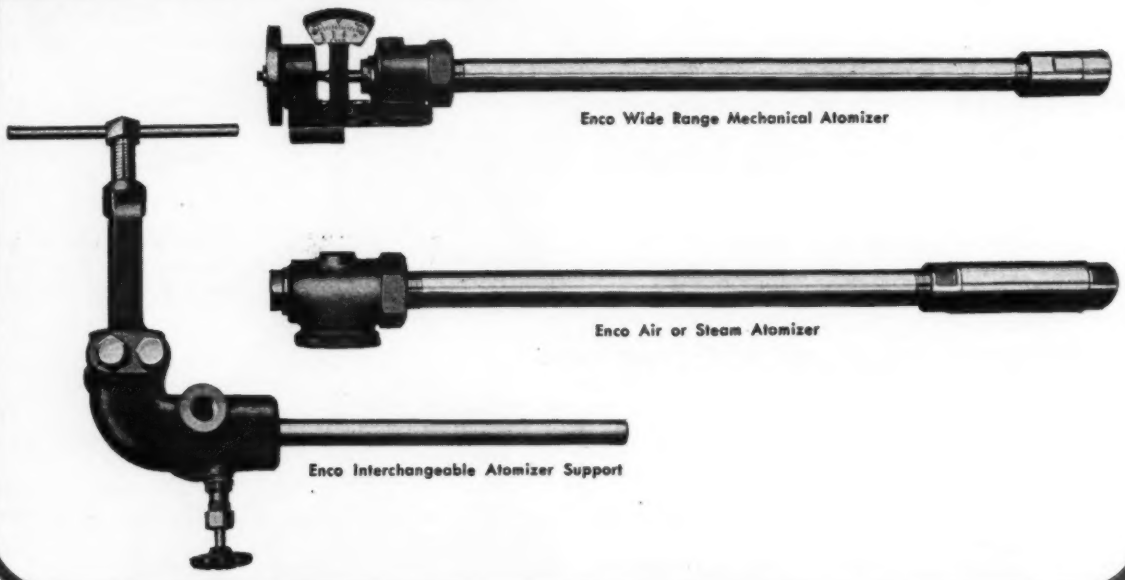
Copyright, 1947, Dodge Mfg. Corp.

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

# For Better Combustion Practice Use

# ENCO INTERCHANGEABLE ATOMIZERS




Interchangeable Enco Fuel Oil Atomizers are improving combustion practice in more and more progressive boiler rooms. Designed for exceptionally wide capacity ranges with all grades of liquid fuels, they eliminate burner tip changes, through the entire load range.

1. *Wide Range Mechanical Atomizers*—With a capacity range of 10 to 1—controlled manually at atomizer or automatically from remote station—*constant high oil pressure at atomizer insures efficient atomization over entire load range without recirculating or returning oil.*
2. *Steam or Air Atomizers*—Capacity range of 10 to 1—controlled by manual or automatic pressure regulation.

Both atomizers are designed to fit the Enco Interchangeable Atomizer Support. Enco Straight Mechanical Atomizers are also available.

Enco Fuel Oil Atomizers are built to give most economical, efficient service for any type pulverized coal, gas or oil-burning air register as well as for stoker-fired and industrial type furnaces. They can also be used independently for special applications.

The Engineer Company maintains a research and planning staff to help you improve your combustion practice. Literature completely describing any Enco product will be sent on request.

EC-473

**THE ENGINEER COMPANY**
**ALSO PRODUCES:**
Enco Air Registers
Enco Fuel Oil Pumping and Heating Units
Enco Automatic Oil-Electric Ignition Systems
Enco Automatic Combustion Controls
Enco Streamline Baffles

## THE ENGINEER COMPANY

75 West Street, New York 6, N. Y.

*Canadian Representative:*
F. J. Raskin, Inc.
4220 Iberville St., Montreal 34, P. Q.

## Insatiable Paper Consumption Presents Problems

▶▶▶ INTO THE HUGE MAW of this paper-hungry country this year has gone a recordbreaking tonnage of paper products. But the hunger is not satisfied. Paper-consuming America is back at the serving table like Oliver Twist, asking for "more."

At the close of 1947, this country alone will have consumed almost as great a tonnage of paper products as the entire world produced in 1937.

As we come to the threshhold of the new year, the trend is still definitely and continuously upward. Figures for 1947 will show that we are crowding close to the 25,000,000 ton consumption mark—an advance of almost 5,000,000 tons in the past three years. Provided we can get the wood pulp, we may conceivably reach the 30,000,000-ton mark by 1950.

We repeat and stress that—*it all depends upon our available supply of wood pulp.* This past year, Canada has been our ace in the hole. She has made up to us more tonnage of wood pulp than we lost from prewar European sources. The question is: can she continue to ship us the amount of wood pulp and pulpwood that we must have to maintain our operations at maximum volume?

For the past five years, wood pulp capacity in the United States has increased about one per cent a year, while our consumption of pulp products has increased about ten per cent a year. Added tonnage must come from sources outside this country, and Canada seems the most likely source of a dependable supply.

Look at the latest record. Says the News Print Service Bureau—"News print production in North America in October was the largest for any one month in history."

"The total of 502,874 tons, compared with 476,265 tons in October last year—shipments were 501,111 tons last month compared with 477,266 tons in October, 1946."

Canada ships us 82 per cent of her production. Deducting our production of about 64,000 tons for that month, Canada shipped about 458,500 tons of newsprint.

Her mills are being driven at better than 100 per cent capacity, six days of every week. She is laboring under economic handicaps at that.

A recent report showed that her costs are counting. Her logs have advanced to 173 per cent and her labor to 152 per cent more than 1939 basis, but her contract prices on newsprint have only advanced 80 per cent or $90 per ton delivered, New York, while hungry consumers will pay an open market price of $200 per ton for what little free tonnage is available.

Certainly something is wrong with this picture—and what's wrong will be righted. For this world-wide shortage of wood pulp is no temporary situation. Finding new wood areas, building new mills and providing new wood pulp capacities, is a long, slow and immensely expensive process.

The United States and Canadian paper industries are faced with a continually mounting demand for every last ton of product possible to produce. And that demand is buttressed by the most amazing growth in population (which means new consumers) that the western hemisphere ever knew.

The paper industry's prewar bogey man of overproduction lies buried deep beneath a mountain of augmenting end-use demand for every shred of paper it can make for years to come.

It is almost a physical impossibility for supply to overtake demand for paper products in the reasonably near future. Contemplation of the Alaskan proposition ought to be sufficient to convince the most skeptical. The greedy maw of the consumer demand is wide open. *Try to fill it!*

## "With All Thy Getting Get Understanding"

▶▶▶ HAVE YOU EVER TRIED to listen to a man who was an expert in his field but who could not talk or at least could not put his thoughts in a language understandable to you? Contrariwise, have you ever tried to pass on some helpful information to a person who you knew did not understand what you were saying or who was discourteous enough as not to listen? Probably, you have experienced both of these situations, as most people have; and have either shrugged your shoulders and said "so what!" or just pondered on what could be done about them.

In the first situation, it might be said that the problem belongs to the other fellow; but, on second thought, may be there is fault on both sides. Perhaps you should have taken advantage of numerous opportunities to become better informed. If so, you would have had less difficulty in understanding him. Possibly, too, the speaker should have taken it upon himself to whittle down some of his high brow talk and, again, the message would have gone over easier.

Just because he is an expert and you are not is no reason for inability in getting together with a vocabulary familiar to both. Yet how often we hear the statement, "He talks a different language." This remark does not mean a different native tongue, but rather the use of a vocabulary that is unfamiliar to one not versed in the technicalities of the subject.

Men in the same field but in different occupations often find it difficult to reduce their talks to a common denominator. It is true that each specialist may have a language unto himself when talking to other men in the same work; but why should it not be possible to simplify the language so it is understandable to anyone.

A college professor who was always over the heads of his students, taught one course that came to be known by everyone who took it as Johnson's (not the true name) Secrets.

In the second situation, if the listener is attentive and yet does not understand, it would be well to question why. Maybe by some slight change in wording, you will get the response desired.

If the failure to listen is an act of discourtesy on the part of the other feellow, he is the loser. As Spurgeon has put it, "There is wisdom in generosity, as in everything else."

# This Matter of Thanksgiving—Whether November, December or June

**WILLIAM SIBLEY**

▸▸▸ LAST MONTH I spent Thanksgiving Day in the picturesque and livable little town of Baton Rouge, Louisiana. Interesting, for a change. Particularly when there is eight inches of snow in Chicago plus a penetrating wind at 11 to 15 degrees above zero, whereas down there it was 72 degrees, no wind, a cloudless blue sky—an altogether perfect day. I'm for Baton Rouge on Thanksgiving (or Christmas or Valentine's Day—but *not* Fourth of July or Labor Day).

Yes, I'm for Baton Rouge on Thanksgiving Day even if some of the old timers are still fighting the Civil War—the Daughters of the Confederacy still damns the Yankees—and most of the population is getting the late Huey Long's brother into (or kept out of) the Governor's chair.

Yes, I am for Baton Rouge on Thanksgiving Day—except that their popular notion of history manifestly has more to do with Evangeline and her Gabriel (who settled this bayou country after having been driven out of "the forest primeval" by the British) than with Priscilla and her John (who made life uncomfortable for the doughty old Cap'n Standish). They—or at least a dozen of them—don't know much about the Thanksgiving Proclamation; who originated it or when.

There I was munching on my breast of turkey (with corn bread dressing—and very good, too) occupying a tiny table for two on the dining room's "mezzanine." Immediately below me was a table gayly decorated and groaning under a feast for twelve. Cocktails were poured and bon vivants consumed until tongues loosened, nerves relaxed, poise forgotten, and everyone had much for which to be thankful. Presently the conversation became serious when one member of the party insisted that President Monroe issued the first Thanksgiving Proclamation. Yet another, equally convinced he was right, said it was President Jefferson. This debate cowed the majority of the party (none of whom could set him or herself up as an authority) until one man came up with the ludicrous, yet sincere, belief that it was none other than William Henry Harrison who perpetrated this "last Thursday of November" custom on America.

Well—let's help out those who believe in or despise the Long family by stating here and now that the first presidential Thanksgiving Proclamation was written and signed by none other than President George Washington in the year 1789.

As for me, I think often of these things whether it be during November or July, February or May.

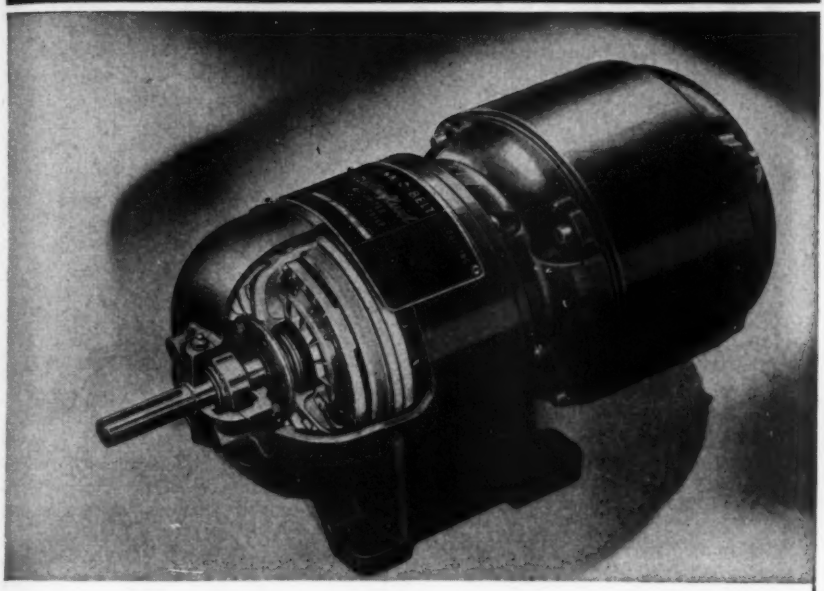
Thank you, God, for having me born an American, I love America. I love my work; my workmates; the things I do each day. I love my home; the clean clothes I have to wear; the white light or the music that answers the command of my fingers at a switch.

Please, God, keep America very strong, like history books show it to have been, always. Let us help those who have little and show them the ways which have made us prosperous and happy. Make us strong for those who need and appreciate our help. Make us strong to resist those who would take away the things which give to our strength, happiness and prosperity.

Please, God, help us to do right with all the things you have given to us. We have much to do in world affairs. We have even more to do in domestic affairs. You, and *you alone* can help us. Make it possible that we can accept Thy judgment.

**Our country now stands at a cross-roads of its history. . . . In this crucial period, we deem it highly desirable that a comprehensive program of education in the ideals and practices of American democracy be launched. Americans tend to take their democratic government for granted. We think of it as we would a familiar landmark. It was there yesterday; it is here today; it will be there tomorrow. But that is not the history of the struggle for human freedom. The price of liberty continues to be the eternal vigilance of those who enjoy it—especially in a world of rapidly changing values.—*(From The American Heritage Program, and The Freedom Train.)***

# TAKE *SHOCK* OUT OF TOUGH DRIVES WITH LINK-BELT *Electrofluid* DRIVE



## "MOTORIZED HYDRAULIC POWER" *ASSURES* CONTINUOUS TROUBLE-FREE OPERATION!

The Electrofluid Drive combines with virtually all types of Link-Belt constant and variable speed reduction gear units and chain drives to afford shock-proof, efficient, economical transmission of power, embodying important features in starting and overload protection. Three principal advantages are:

(a) It permits the use of a smaller motor than otherwise might be required—improves power factor and overall efficiency.

(b) It prevents damage to costly power-driven equipment and motor.

(c) It provides a smooth transmission of power, eliminating shocks which could damage material in process.

Ask for Book 2085-A giving full details and application suggestions.

10,739-A

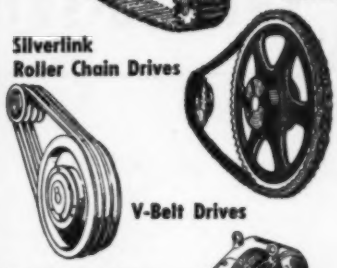
**LINK-BELT COMPANY**

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

Link-Belt Power Transmission Machinery meets the exacting requirements of all industry.

Silverstreak Silent Chain Drives

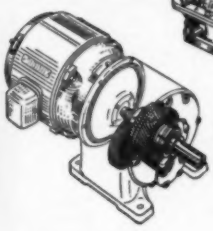
Silverlink Roller Chain Drives



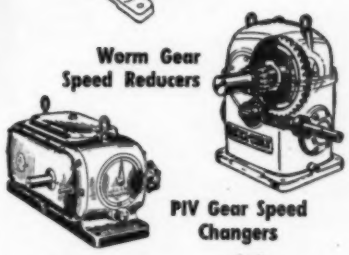
V-Belt Drives

Herringbone Gear Speed Reducers

Gearmotors



Worm Gear Speed Reducers



PIV Gear Speed Changers

Ball Bearing Mounted Units

Roller Bearing Mounted Units

Unmounted Ball and Roller Bearings

Babbitted Bearings

# LINK-BELT *Power Transmission Machinery*

## *BILL, WITH ME - - -*

## SHEET-TO-SHEET UNIFORMITY IS MORE IMPORTANT THAN SKID-TO-SKID UNIFORMITY!

—And this is one of the many superior qualities you find in paperboard surface that is sized with Kelgin*, the algin surface sizing agent. It insures uniform ink absorption, full high gloss ink printing control, provides consistently uniform results.

Kelgin is a product of nature that has been rigidly processed, is free of impurities and easy to use. It is soluble in both hot and cold water and adaptable to water box or size press application. With Kelgin, you find no foaming, picking or sticking to the rolls. It additionally reduces the tendency of sheets to curl.

This modern surface sizing agent is highly economical. For full information on the adaptation of Kelgin to your particular application, just drop us a line.

# KELCO COMPANY

*Trade Mark Reg. U. S. Pat. Off.

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# Your Everyday Piping Needs Now Filled from Local Stocks

## No waiting for most regular items at your Crane Branch or Wholesaler

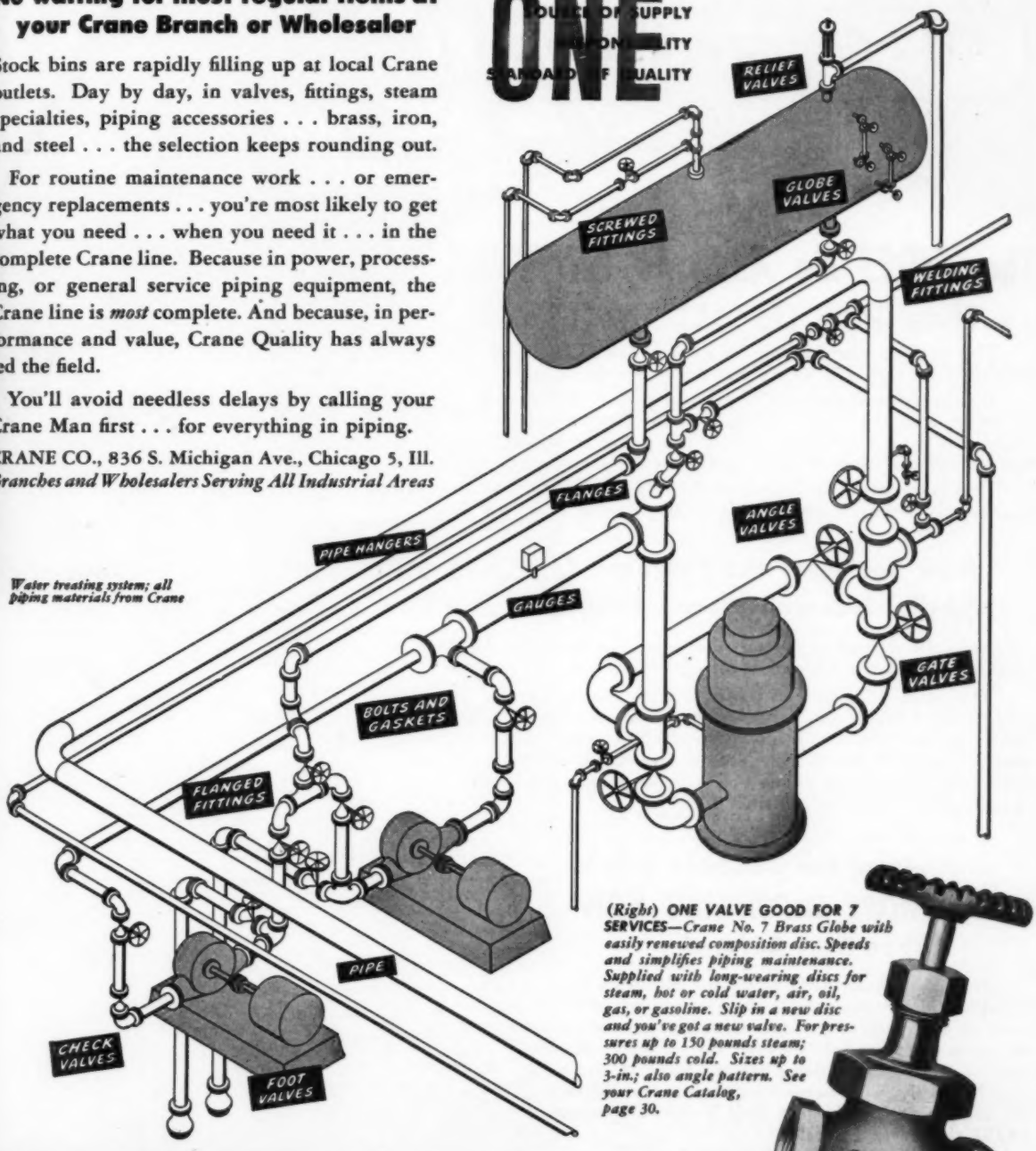
Stock bins are rapidly filling up at local Crane outlets. Day by day, in valves, fittings, steam specialties, piping accessories . . . brass, iron, and steel . . . the selection keeps rounding out.

For routine maintenance work . . . or emergency replacements . . . you're most likely to get what you need . . . when you need it . . . in the complete Crane line. Because in power, processing, or general service piping equipment, the Crane line is *most* complete. And because, in performance and value, Crane Quality has always led the field.

You'll avoid needless delays by calling your Crane Man first . . . for everything in piping.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
*Branches and Wholesalers Serving All Industrial Areas*

ONE SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY




*Water treating system; all piping materials from Crane*

(*Right*) **ONE VALVE GOOD FOR 7 SERVICES**—*Crane No. 7 Brass Globe with easily renewed composition disc. Speeds and simplifies piping maintenance. Supplied with long-wearing discs for steam, hot or cold water, air, oil, gas, or gasoline. Slip in a new disc and you've got a new valve. For pressures up to 150 pounds steam; 300 pounds cold. Sizes up to 3-in.; also angle pattern. See your Crane Catalog, page 30.*

EVERYTHING FROM . . .

VALVES • FITTINGS
PIPE • PLUMBING
AND HEATING

# CRANE

FOR EVERY PIPING SYSTEM

# It's the SIDES OF A V-BELT That Really GET the WEAR!

Diagram of V-Belt in Sheave Groove

## —ONLY the SIDES Touch the pulley!

## The SIDES Do ALL the GRIPPING —They Pick Up ALL the LOAD!

The moment you think about it, you realize, of course, that the *sidewall* is the part of a V-Belt that really gets the wear.

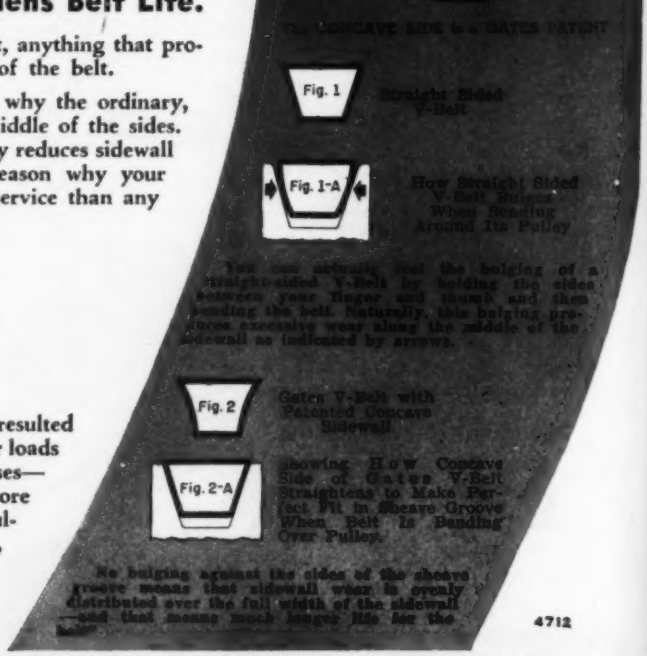
It's the *sidewall* that has to grip the pulley. It has to *pick up* all the power from the driver pulley, transmit that power to the belt as a whole and then, once more, deliver the power to the driven pulley. And the sidewall takes all the wear against the sheave-groove wall.

That is the perfectly natural reason why you have always noticed that the sidewall of the *ordinary* V-Belt is the part that *wears out first!*

## Now See How the Patented CONCAVE SIDE SAVES Sidewall Wear—Lengthens Belt Life.

Since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the middle of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belt can possibly give.


The CONCAVE SIDE is a GATES PATENT
Fig. 1
Straight Sided V-Belt
Fig. 1-A
How Straight Sided V-Belt Bulges When Bending Around Its Pulley
You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.
Fig. 2
Gates V-Belt with Patented Concave Sidewall
Fig. 2-A
showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley.
No bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall —and that means much longer life for the belt.
4712

## —and the Concave Side is MORE IMPORTANT NOW Than Ever Before!

Now that Gates *SPECIALIZED* Research has resulted in Super Vulco Ropes capable of carrying much heavier loads —up to 40% *higher horsepower ratings* in some cases— the sidewall of the belt is called upon to do even more work in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important NOW than ever before!

**THE GATES RUBBER COMPANY DENVER, U. S. A., *"World's Largest Makers of V-Belts"***

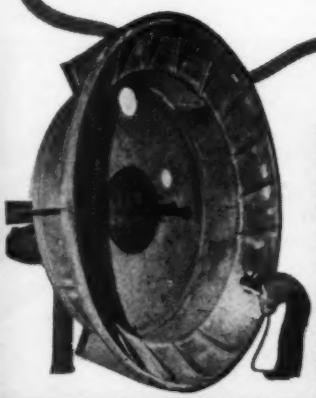
**GATES VULCO ROPE DRIVES**

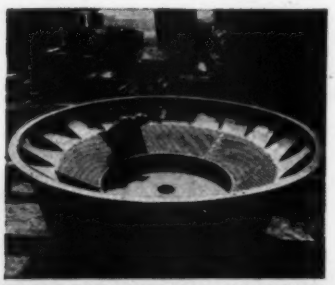
Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Gates
THE MARK OF SPECIALIZED RESEARCH

# How the new DILTS Hydrapulper SAVES YOU MONEY 4 WAYS

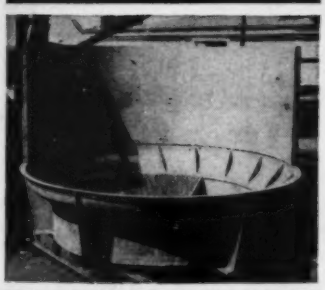
1 Cuts assembly time
2 Resists corrosion and wear
3 Protects paper stock
4 Boosts output





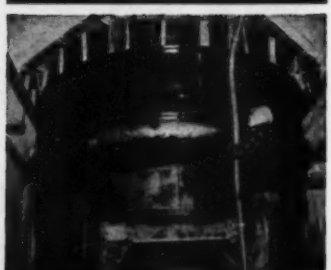
1 WELDING STATIONARY VANES of pure Nickel to the dished bottom of the Nickel-Clad Steel hydrapulper.

2 INSTALLING EXTRACTOR PLATES on the completed bottom. This section is now almost ready for shipment.



3 SIDE PLATES of rolled Nickel-Clad Steel are made in two sections. They are joined to each other and to the bottom plate by welding on the job.

4 INSPECTING THE WELDS. Permanently leakproof, the welded seams eliminate caulking, help reduce vibration, provide more rigid construction.



5 LOOKING INTO the completed *Dilts Hydrapulper* from upper level. The rotor, made of 3% nickel cast iron for resistance to wear and abrasion, reduces furnish to slush at 195 rpm.

6 EXTERIOR VIEW from lower level. This all-welded unit of Lukens Nickel-Clad Steel was designed jointly by *Smith & Caffrey Co., Syracuse, and Dilts Machine Works, Fulton, N. Y.*, a division of Black-Clawson Co., Inc., Hamilton, O.

***FOUR WAYS,*** did we say? Better change that to *five.*

For this hydrapulper is constructed almost entirely of Lukens Nickel-Clad Steel.

And that means another saving. Lukens Nickel-Clad Steel not only protects your paper stock from rust stains and other damage, *it brings you all the strength and corrosion-resisting qualities of pure Nickel at a much lower price than you'd pay for the solid metal.*

Credit the SMITH & CAFFREY COMPANY, Syracuse, and the DILTS MACHINE WORKS, Fulton, N. Y., for this simple and efficient hydrapulper design. It permits building and shipping the unit in four sections. It saves construction cost and time. It saves shipping time and space and weight. And it makes final assembly an easier, quicker job!

The twelve-foot-diameter hydrapulper you see pictured here is now in service at the National Paper Corporation plant in Ransom, Pa. They use it mostly for processing facial and toilet tissues.

At National, the basic furnish is a combination of virgin pulps and reclaimed paper. It is quickly broken down to flowable form by the rotor which turns at 195 rpm. Each batch is thoroughly defibered and blended in a matter of seconds.

In the pulp and paper industry, Lukens Nickel-Clad Steel is widely—and wisely—used wherever rust and corrosion threaten quality production or endanger equipment life. You'll find a lot of helpful information about this economical construction material in the illustrated booklet, ***Lukens Clad Steels.*** Write us for your free copy.

**THE INTERNATIONAL NICKEL COMPANY, INC.**
***67 Wall Street, New York 5, N. Y.***

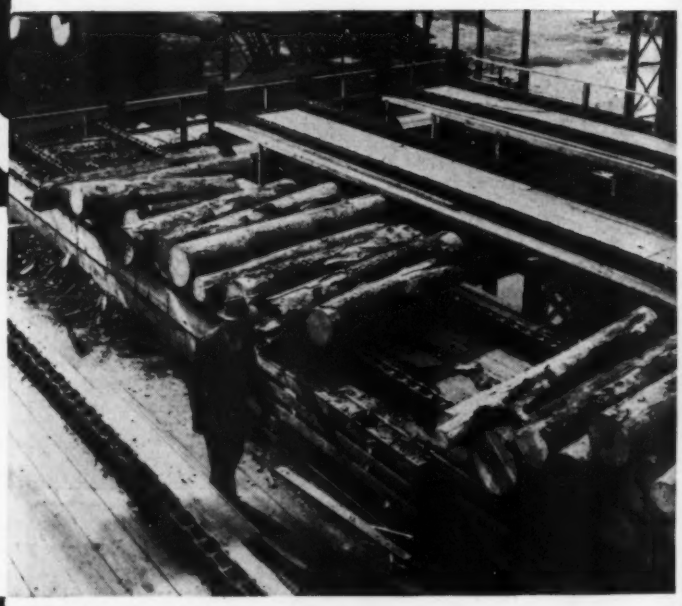
EMBLEM OF SERVICE
**NICKEL (INCO TRADE MARK) ALLOYS**

MONEL* • "K"* MONEL • "S"* MONEL • "R"* MONEL • "KR"* MONEL
INCONEL* • NICKEL • "L"* NICKEL • "Z"* NICKEL *Reg. U.S. Pat. Off.

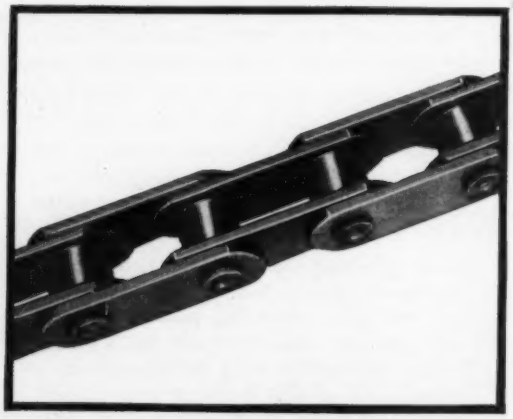
## Need a chain with EXTRA strength?

# Rex Chabelco

① **HERE'S THE CHAIN** that's *extra* tough . . . *extra* rugged for mill service. Rex Chabelco Steel Chain is built to stand up under the toughest type of operating conditions to give you years of dependable service.



② **TAKE THIS MILL,** for example. With the application assistance of the Rex Man, rugged Rex Chabelco was installed to feed logs into the mill. It's all in the day's work for Chabelco to have whole sling loads of logs dropped on the chain as shown here. And it will keep right on working through years of economical service. There'll be no production hold-ups here due to premature chain failures.



③ **AS SHOWN** in this close-up, each part of Rex Chabelco is built to exacting specifications. The straight side bar type shown here is the ideal chain for extra heavy-duty conveyor work. Offset side bar types are used for normal heavy-duty conveyors and drives. They maintain accurate pitch, assuring correct alignment of attachments throughout their operating life. The Rex Man will be glad to assist you in the application of Chabelco for your mills. Ask him also about Baldwin-Rex Roller Chain for your high speed drives. Write Chain Belt Company, 1714 West Bruce Street, Milwaukee 4, Wis.

REX CHAIN BELTS

CHAIN BELT COMPANY of Milwaukee

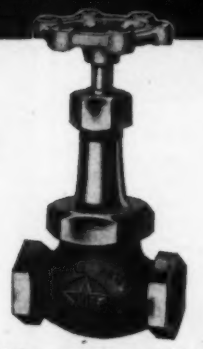
# *Only* POWELL makes a *complete* line of valves for the CHEMICAL & PROCESS INDUSTRIES

More than a century ago, the Wm. Powell Company adopted a definite, long-range policy, namely, to concentrate on making valves—and valves only—for all branches of industry. As a result Powell has been able, through the years, to meet each new flow control requirement as it has arisen. Thus at any given time in more than a hundred years, the Powell Line has always been *complete*.

As of today, the Powell Line includes Bronze and Iron Valves of all required types, designs and sizes; Cast Steel Valves of all types in pressure classes from 150 to 2500 pounds; and Valves for Corrosion Resistance, available in the widest range of metals and alloys ever used in making valves.

**The Wm. Powell Co., Cincinnati 22, Ohio**

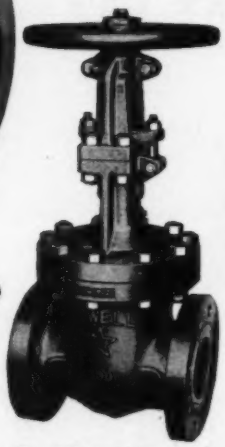
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES



200-pound Bronze Globe Valve with renewable stainless steel seat and regrindable, renewable "Powellium" nickel-bronze disc.

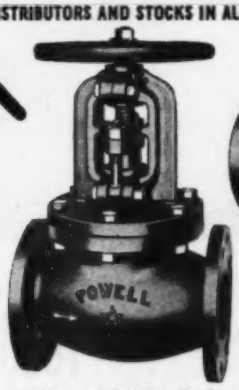
200-pound Bronze Gate Valve with renewable "Powellium" nickel-bronze disc.

Large 125-pound Iron Body Bronze Mounted or All Iron O. S. & Y. Gate Valve.

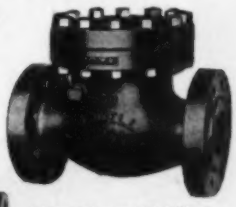


Class 300-pound Cast Steel O. S. & Y. Gate Valve.

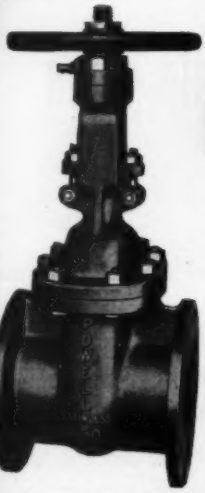
Large size 150-pound Stainless Steel O. S. & Y. "Y" Valve.




150-pound Stainless Steel O. S. & Y. Globe Valve.

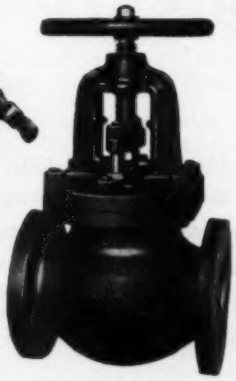


Class 600-pound Cast Steel Swing Check Valve.



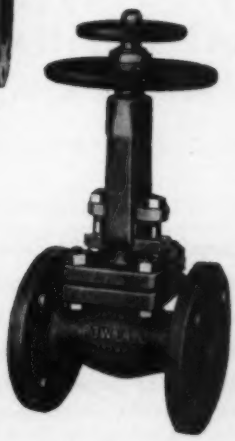
New, standard 150-pound Stainless Steel O. S. & Y. Gate Valve.

150-pound Stainless Steel O. S. & Y. "Y" Valve. Gate, Globe, and Angle Valves also available in this design.



125-pound Iron Body Bronze Mounted or All Iron O. S. & Y. Globe Valve.

125-pound Iron Body Bronze Mounted or All Iron "Master Pilot" Gate Valve.



150-pound Stainless Steel O. S. & Y. Globe Valve with Powell Patented Seat Wiper.

# POWELL VALVES

# P-426 BECKAMINE

## The exceptionally stable...

## readily cured urea-formaldehyde resin

Here's why P-426 Beckamine is the resin of choice for imparting wet strength to paper for a multitude of uses. Comparatively small amounts of resin vastly increase the wet strength, tensile strength, fold and Mullen of papers manufactured from many types of pulp. P-426 can be applied in the beater, at the fan pump or head box, or directly to the sheet at the size press. No special curing procedures are required, and it is stable in storage. Further details are available direct from the Sales Department at Detroit.

**REICHHOLD CHEMICALS, INC.**

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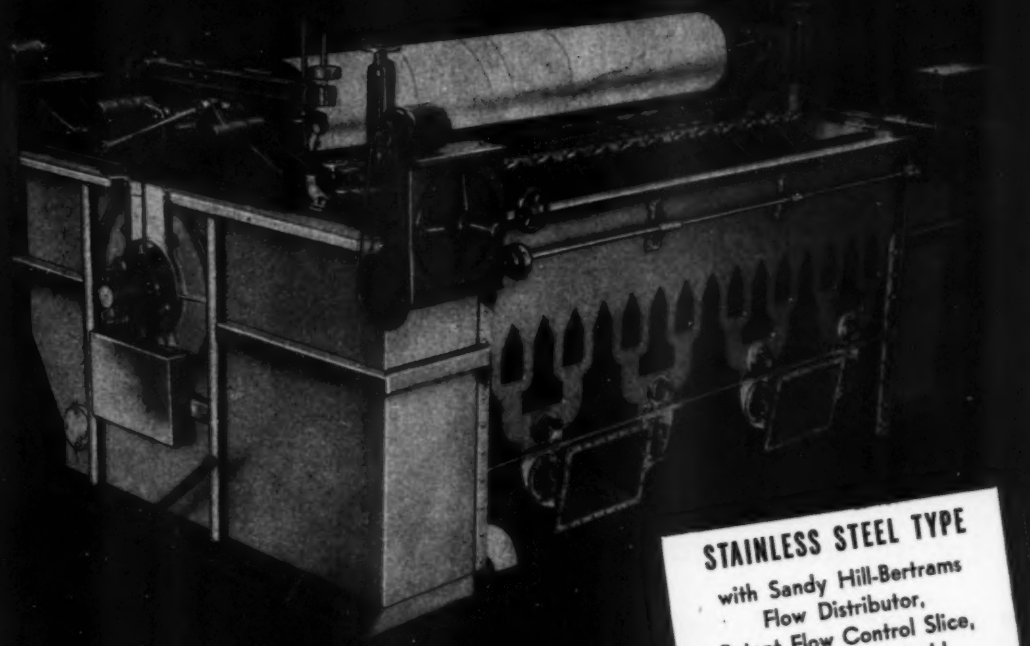
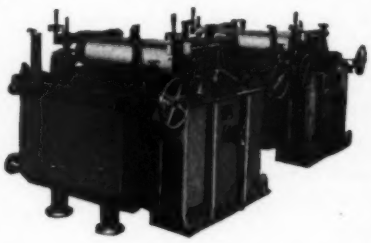
SYNTHETIC RESINS • CHEMICAL COLORS • PHENOLIC PLASTICS • INDUSTRIAL CHEMICALS

# Sandy Hill Cylinder Mould Vats



**STAINLESS STEEL TYPE**
with Sandy Hill-Bertrams Flow Distributor, Patent Flow Control Slice, and Movable Mould



Two of a complete set of four stainless steel vats for a multiple cylinder machine. These have all the features and adjustments described at the right.

## "Not just a mould in a tub, but a precision machine with facilities for getting the most out of a given furnish"

That, in brief, is the appraisal, by a well-known paper-making authority, of the Sandy Hill Cylinder Machine Vat.

Several types are available, each designed and constructed to give the best solution to the problems of distribution of approach flow and maximum opportunity to vary flow through the vat to meet specific formation requirements.

The type illustrated above features:

- Direct flow vat equipped with Sandy Hill-Bertrams Flow Distributor to give even mixture over full width of mould.
- Counter flow vat may also be furnished.
- Special patented design permitting movement of mould 6" both horizontally and vertically while operating.
- Vat is provided with an overflow for recirculation.
- Combination Sandy Hill Slice and Making Board, giving means of controlling the stock as it enters the circle, regulating formation and speed of stock at forming point.

Let us show you how well the proper type will fit into your production scheme.

**THE SANDY HILL IRON & BRASS WORKS**
HUDSON FALLS, N. Y.

UNION PACIFIC

# TREASURE MAP OF INDUSTRY

# Nevada

- *Variety of metals, minerals and ores of value to industry*
- *Power and irrigation projects*
- *Good living conditions*
- *Colorful scenic attractions*
- *Excellent rail transportation*

* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

Manufacturers, packers and processors will find Nevada a storehouse of raw materials. There are deposits of copper, silver, gold, zinc, lead and uranium. Mineral ores and minerals include tungsten, manganese and antimony ore, magnesite, gypsum, sulphur, borax and vanadium. Building stone and marble also are available.

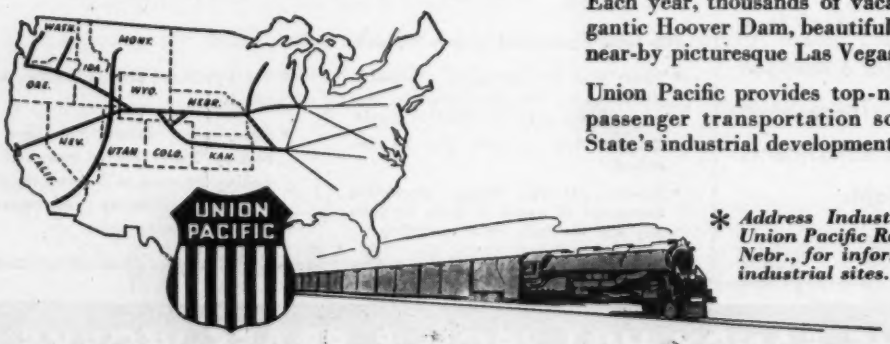
Cattle, sheep and poultry raising are expanding agricultural pursuits and there also is some production of a variety of grains, vegetables and fruits.

Irrigation and power are supplied by several Federal projects including famous Hoover Dam.

Nevada's healthful climate, excellent educational system, and a variety of scenic attractions contribute to the advantages of living in this western area.

Each year, thousands of vacationists visit gigantic Hoover Dam, beautiful Lake Mead and near-by picturesque Las Vegas.

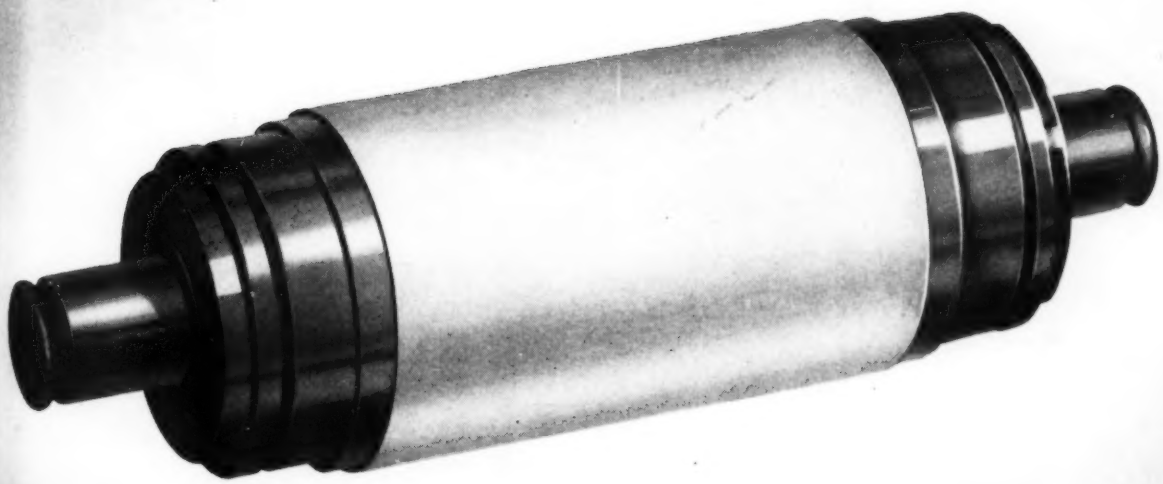
Union Pacific provides top-notch freight and passenger transportation so essential to a State's industrial development.




* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebr., for information regarding industrial sites.*

## UNION PACIFIC RAILROAD

*THE STRATEGIC MIDDLE ROUTE*



*Perkins Calender Rolls are the natural result of the longest and broadest experience in this highly specialized industry.*

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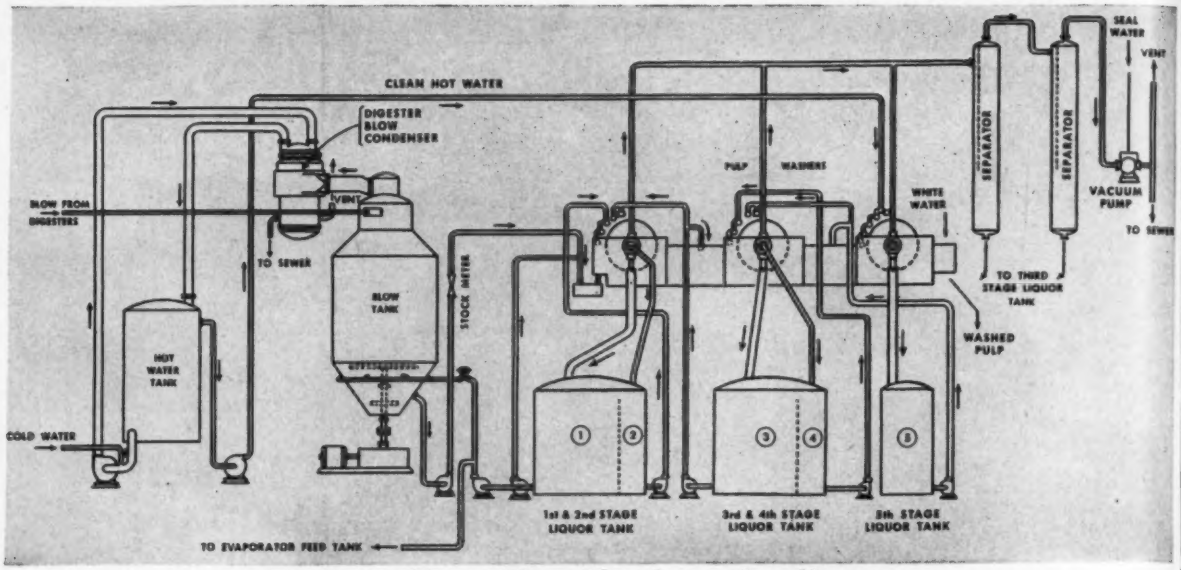
ENGINEERS AND MANUFACTURERS

HOLYOKE, MASSACHUSETTS




Flow diagram of Swenson-Nyman 3-drum 5-stage pulp washing system.

# Dilution is Reduced

## *by the multi-stage multiple-unit method of*

# SWENSON-NYMAN PULP WASHING

TODAY, pulp mill operators think in terms of four-, five-, and six-stage washing—employing Swenson-Nyman drums in series. Each drum washes in two stages, with a repulper between drums. Each stage employs as wash water the liquor drained from the succeeding stage . . . with fresh, clean water used only for the final stage.

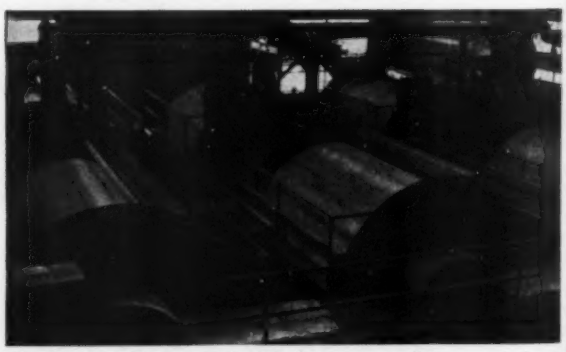
Dilution is a direct indication of washer room efficiency that reflects in evaporator loads, and fuel and steam costs. Hence, the favorable performance of recent installations of Swenson-Nyman Pulp Washers is attracting industry-wide attention.

Results from such multi-stage multiple-drum operation have shown cleaner pulp, less dilution, reduced chemical loss, and almost total absence of foaming difficulties.

The Swenson-Nyman process operates as a closed system—eliminating waste of valuable chemicals to the sewer, and avoiding problems of stream pollution.

Swenson's leadership in supplying improved equipment for pulp mill processes is amply demonstrated by the successful results of the Swenson-Nyman Pulp Washer. Swenson Engineers will gladly help you with an analysis of your operations, and recommend the installation best calculated to bring your mill up-to-date.

Write or phone for a preliminary consultation.



Six Swenson-Nyman Pulp Washers arranged in two 3-drum lines. Each line provides 5-stage washing.

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THE PAPER INDUSTRY
and PAPER WORLD

DECEMBER 1947

# Power Piping *in* Paper Mills

**ARTHUR McCUTCHAN**
**Senior Research Engineer**
**Tube Turns, Inc.**

PIPING REQUIREMENTS of a modern paper mill power plant differ in no essential from those of central station steam plants. Such differences as do exist are brought about by the smaller capacity of the steam generators and the general use of back-pressure turbines, or condensing turbines with provision for extracting most of the steam for process.

The requirements for continuity of service in the paper mill power plant appear to be no less severe than in a central station; however, the reserve or standby steam generator capacity often is much less adequate.

In view of this general similarity of service, the following discussion of piping design, which is based on central station practice, should be of interest to the paper mill power plant operator.

Since the bulk of the high-pressure steam and feed water pipe lines will be designed by competent engineering organizations and the fabrication and erection carried out by skilled fabricators, it might be questioned why the paper mill power plant operator should be concerned about the particular design details employed. If all pipe lines gave equally trouble-free operation, and if piping maintenance were not frequently one of the major items of power plant maintenance expense, there would be no reason for concern about such details. But, even in the best piping systems, there are occasional leakages of flanged line joints, valve bonnet joints, or other causes of outages attributable to piping. The increased use of welded construction has materially reduced piping maintenance, but in many systems the desire for ready disassembly of connections to valves and equipment has prevented taking full advantage of welded construction.

A basic tenet of the author's training is that those charged with the daily operation and maintenance of a power plant should have a voice in the selection of equipment. Where this practice is followed, the plant operator finds it desirable to take stock of his operating experience at frequent intervals and to compare his results with those obtained with newer types of equipment in his own or allied industries.

## Steam Conditions

In the central station power plant the choice of steam pressure and temperature is based on an economic balance between the increase in cost of steam generators, turbines, piping, etc., for the higher pressures and temperatures and the fuel saving effected thereby. In the case of the paper mill power plant, the choice of initial steam conditions is influenced principally by the balance between power and process steam requirements of the particular paper mill.

Since power generated from extracted steam or back-pressure operation is obtained at a heat rate of about 4500 Btu per kw-hr. in the fuel as compared with 14,000 to 20,000 Btu per kw-hr. for steam going to the condenser, it is important to have the process steam and electric requirements in as good balance as can be obtained. Where process steam requirements are reduced for any reason it may be necessary to purchase electricity from the outside or to operate the turbines condensing. Both procedures tend to increase operating costs. However, the ability to operate condensing, although giving a higher Btu rate, greatly increases the flexibility of operations.

According to a recent survey, 600 psi, 750 Fahr. appears to be about the upper limit of pressure and temperature for paper mill power plants. One plant was designed for 900 psi, 825 Fahr., while one other was built for 600 psi, 825 Fahr. The majority of the steam generating equipment was designed for 400 to 450 psi and 650 to 700 Fahr., or lower pressures and temperatures.

## Selection of Pipe Material

Since operating temperatures above 750 Fahr. appear to be the exception rather than the rule for paper mill power plants, this discussion of pipe material is limited to carbon steels. As long as temperatures do not exceed 825 Fahr., there is no cause for concern as to possible deterioration of carbon steels due to graphitization. The extensive surveys, investigations, and discussions of graphitization conducted by the central station industry would seem therefore to have only an indirect interest to the paper mill power plant operator.

## Seamless Pipe

Seamless pipe is most commonly used for superheated steam and boiler-feed lines in power plants. Pipe for such purposes usually is purchased to ASTM Specifications A106 or A53. Both the low carbon, Grade A, and medium carbon, Grade B, steels of A106 are now required to be "silicon-killed." If intended for service above 700 Fahr., the higher allowable stresses permitted for silicon-killed steels (see Table 1) may make their use particularly desirable. A minimum silicon content of 0.10 percent must be expressly specified when purchasing silicon-killed pipe to ASTM A53.

Supplementary tests of an optional nature on both ends of each length of pipe are provided for in ASTM A106 where assurance of the highest grade of pipe is desired. These tests are normally required only for pipe 8 in. and

larger, but may be extended to smaller sizes by special agreement. The cost of such tests, which is borne by the purchaser, amounts to an increase of from 20 to 30 per cent in the cost of Schedule 80 pipe in sizes 8 to 12 in. inc., and is proportionately greater in the smaller sizes. In addition to the extras for special tests, where specified on the order, pipe made to ASTM A106 costs about 10 to 15 per cent more than the same pipe made to ASTM A53 principally because of the more stringent surface inspection requirements of A106 and the consequently greater percentage of rejections. The extra cost of pipe to A106 and the need for the supplementary tests must be weighed against the greater assurance of a completely satisfactory product. For service conditions not exceeding 600 psi at 750 Fahr., these supplementary tests are generally considered to be unnecessary.

**TABLE 1—Allowable Stress (S Values) psi for Pipe in Power Piping Systems**

| | Piping Code | | Piping and Boiler Code | | | |
|---|---|---|---|---|---|---|
| Carbon Steel Pipe | 150 (Fahr.) | 350 (Fahr.) | 650 (Fahr.) | 700 (Fahr.) | 750 (Fahr.) | 800 (Fahr.) |
| ASTM A106, Grade B | 15000 | 13800 | 12000 | 11400 | 10400 | 9100 |
| ASTM A53, Grade B (Silicon-killed*) | 15000 | 13800 | 12000 | 11400 | 10400 | (9100)** |
| ASTM A53, Grade B | 15000 | 13800 | 12000 | 11400 | 9950 | (8300) |
| ASTM A106, Grade A | 12000 | 11040 | 9600 | 9250 | 8700 | 8000 |
| ASTM A53, Grade A (Silicon-killed) | 12000 | 11040 | 9600 | 9250 | 8700 | (8000) |
| ASTM A53, Grade A | 12000 | 11040 | 9600 | 9100 | 8250 | (7250) |

*A minimum silicon content 0.10 per cent must be specified for pipe, if silicon-killed pipe is wanted. This requirement is included in A106.

**Values in parenthesis are permitted for pipe under the jurisdiction of the Boiler Code, but not if under the Code for Pressure Piping.

## Lap-Welded and Electric-Resistance-Welded Pipe

Where pipe is threaded and is used for steam pressures of 250 psi and higher, or for feedwater at pressures of 100 psi and temperatures of 220 Fahr. and over both the Power Boiler Code and the Code for Pressure Piping require the pipe to be seamless. If pipe is joined by welding, lap-joints (van stone), or by other method which does not reduce the pipe wall thickness at the joint, lap-welded or resistance-welded pipe may be used in place of seamless, for steam and feedwater service provided proper allowance is made for their respective longitudinal joint efficiencies. The use of lap-welded pipe is limited to 750 Fahr. in both the Piping and Boiler Codes. Electric-resistance-welded pipe is limited to 750 Fahr. in the Piping Code, but may be used up to 1000 Fahr. in piping under the jurisdiction of the Boiler Code.

Lap-welded pipe usually is considered to cost less than seamless, but this is not always true for all sizes. In most instances the saving in cost of pipe using lap-welded in place of low carbon seamless is less than 5 per cent, where both are purchased to ASTM A53.

Electric-resistance-welded pipe is priced rather consistently a few per cent below seamless. Where service conditions and code restrictions permit the use of resistance-welded-pipe, some cost advantage may accrue.

## Selection of Pipe Schedule

The selection of pipe wall thickness, or schedule number, is not difficult, but the writer has encountered a number of instances where considerably heavier pipe was used than required for the service. In one case, a ¾-in. wall thickness was specified for a 10-in. steam line which only required 0.365 in. The pipe procurable at the time was 0.500 in. It required several long distance calls to ascertain that the lighter pipe was adequate for the service. A slight familiarity with the methods of determining the necessary pipe wall thickness would have saved considerable time and money.

Care in establishing the pressure and temperature conditions with proper reference to the code having jurisdiction may easily make a difference of 25 to 30 per cent in the cost of pipe. The use of Grade B pipe in place of Grade A or of silicon-killed in place of nonsilicon-killed pipe also may make it possible to use a lighter schedule with increased reliability.

## Code Requirements—Steam Piping

The pressure for which superheated steam piping must be designed was redefined in the 1946 edition of the ASME Power Boiler Code. Pipe connected to the superheater outlet header up to the first stop valve in each connection is required to be designed for a pressure not less than the lowest pressure at which any superheater safety valve is set to blow. Pipe between the first stop valve and the second valve, where boilers are connected to a common steam main, is required to be designed for the expected operating pressure, but not less than 85 per cent of the lowest pressure at which any drum safety valve is set to blow. The design pressure in the Code for Pressure Piping is defined as the "maximum internal service pressure."

The allowable stress (S value) used in computing pipe wall thickness is required by both codes not to exceed that permitted in the tables of S values for the expected steam temperature.

Both the Power Boiler Code and the Power and District Heating sections of the Code for Pressure Piping take cognizance of the fact that pressure and temperature swings occur in operation. The applicable portion of Par. P-23(f) reads as follows:

*"Either pressure or temperature, or both, may exceed the nominal values if the corresponding stress in the pipe wall calculated by the formulas does not exceed the S value allowable for the actual expected temperature by more than the following allowances for the periods of duration indicated:*

*"(1) Up to 15 per cent increase above the S value during 10 per cent of the operating period;*

*"(2) Up to 20 per cent increase of the S value during 1 per cent of the operating period."*

## Code Requirements—Feedwater Piping

The jurisdictional limits for feedwater piping were specifically defined in the 1946 edition of the Power Boiler Code by means of the sketch reproduced in Figure 1. The Code for Pressure Piping should be used as a guide to safe design of feedwater piping outside of the limits defined in Figure 1.

Pipe between the boiler (or economizer if one is interposed) and the check valve, see Figure 1, is required to be designed for a pressure 1.25 times the lowest pressure at which any safety valve on the boiler drum or water space is set to blow. Pipe between this check valve and the globe or regulating valve where two or more boilers are fed from a common source, is required to be designed for a pressure not less than that required to feed the boiler. The pressure required to

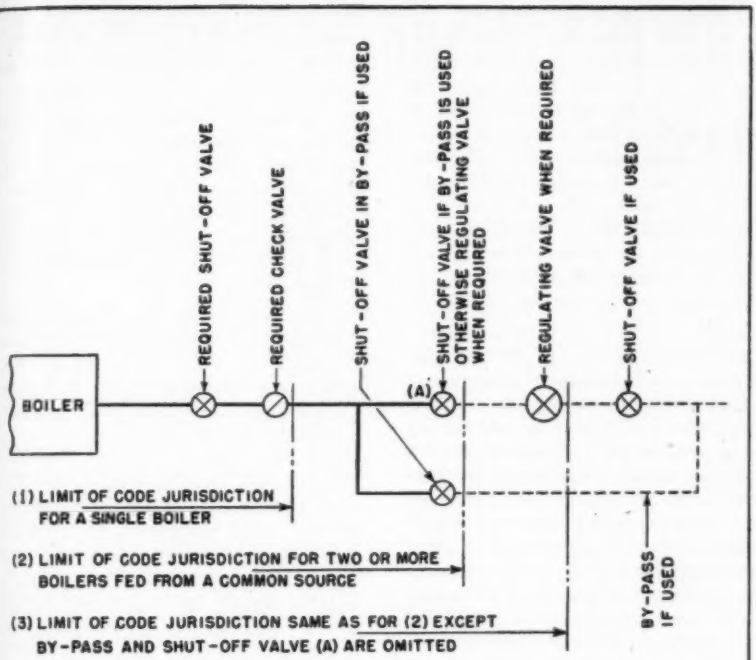
REQUIRED SHUT-OFF VALVE
REQUIRED CHECK VALVE
SHUT-OFF VALVE IN BY-PASS IF USED
SHUT-OFF VALVE IF BY-PASS IS USED OTHERWISE REGULATING VALVE WHEN REQUIRED
REGULATING VALVE WHEN REQUIRED
SHUT-OFF VALVE IF USED
BOILER
(A)
(1) LIMIT OF CODE JURISDICTION FOR A SINGLE BOILER
(2) LIMIT OF CODE JURISDICTION FOR TWO OR MORE BOILERS FED FROM A COMMON SOURCE
(3) LIMIT OF CODE JURISDICTION SAME AS FOR (2) EXCEPT BY-PASS AND SHUT-OFF VALVE (A) ARE OMITTED
BY-PASS IF USED

FIG.-1 POWER BOILER CODE JURISDICTIONAL LIMITS FOR FEEDWATER PIPING

(REPRODUCTION OF FIG. P-44 OF ASME POWER BOILER CODE)

feed the boiler must, of course, take into account friction loss in piping and economizer, if any, and difference in elevation.

The allowable stress (S value) for pipe in both sections is required not to exceed that permitted for the temperature of saturated steam corresponding to the lowest set pressure of any safety valve on the boiler drum. (One or more safety valves are required to be set at or below the maximum allowable working pressure of the boiler.) If the maximum water temperature to be handled is greater than the temperature corresponding to the pressure of the lowest safety valve setting, the S value permitted for the maximum water temperature is to be used. For usual conditions, the saturated steam temperature will be 50 to 150 Fahr. higher than the feedwater temperature. Since the S values for ferrous materials in the Boiler Code are the same for all temperatures 650 Fahr. and lower and the saturation temperature for even 1200 psi is only 568 Fahr., it is apparent that as far as calculation of wall thickness is concerned, the above requirements can be reduced to the statement: the allowable S value shall be that given for 650 Fahr.

The provisions for pressure and temperature swings quoted from Par. P-23 (f) also apply to feedwater piping. It may be noted that the permissible increase of 15 per cent in pipe stress is more than adequate to care for the 6 per cent rise in drum pressure, which is the maximum rise that can occur in a boiler having the required safety valve relieving capacity.

Pipe between the boiler feed pumps and the check valve at the boiler, or regulating valve, if used, is required by the Code for Pressure Piping to be based on the highest pressures exerted by the boiler feed pumps at any load under *normal* operation and on the highest corresponding temperatures actually existing in each part of the system. It should be noted from Table 1 that allowable stresses given in the Piping Code at 150 Fahr. are 25 per cent greater than the 650 Fahr. values so designs based on the actual temperatures may be appreciably lighter than if the 650 Fahr. values were used.

Where means are provided for varying the pump speed or otherwise controlling the pressures in the feedwater piping, advantage may be taken of the provisions for pressure swings to secure a more economical boilerfeed system. Constant speed boilerfeed pumps require that the design pressure of the feedwater piping shall correspond to the pump shut-off pressure, since operation at 25 to 50 per cent of pump capacity will approach that pressure.

A change from one schedule of pipe thickness to the next heavier increases the cost of pipe from 30 to 40 per cent, while a change from one valve and fitting standard to the next heavier may increase the cost of valves by 50 to 100 per cent. In addition to possible reduction in piping cost, substantial savings in pumping power can be effected by variable speed operation and reduction of frictional and throttling losses in the feedwater system. One development along this line has been to have the boiler water level controller, which normally actuates the feedwater regulator valve, control the speed of the boilerfeed pumps. Turbine drives have been controlled successfully in this manner and consideration has been given to similar control of hydraulic coupling drives.

## Allowable Stresses

Typical allowable "S" values for seamless pipe to be used in the pipe wall thickness formula are given in Table 1.

## Wall Thickness Formula

The following pipe wall thickness formula recently has been adopted by both the Power Boiler Code and the Power and District Heating sections of the Code for Pressure Piping:

$$tm = \frac{PD}{2S + 0.8P} + C \text{ or } P$$

$$= \frac{2S(tm-C)}{D - 0.8(tm-C)}$$

in which tm = minimum pipe wall thickness, inches

P = maximum internal service pressure, psi

D = outside diameter of pipe, inches

S = allowable stress due to internal pressure, psi

C = allowance for threading, mechanical strength, and/or corrosion, inches (0.065 in. for pipe, 1 in. size and larger joined by welding or by lap joints; 0.069 in. for threaded pipe, 1 in. to 2 in. size incl.; and 0.098 in. for threaded pipe, 2½ in. in size and larger)

As underthickness manufacturing tolerance of 12½ per cent is provided in ASTM Specifications A106 and A53 so that to arrive at the nominal (average) wall thickness, tm, calcu-

lated from the formula, must be divided by 0.875 and the next heavier commercial pipe wall selected. Tables of minimum wall thicknesses on inspection for nominal (average) pipe wall thicknesses have been appended to the 1946 revisions of the various ASTM specifications for pipe. The nominal wall thicknesses to be ordered may be found directly from these tables. Convenient tables of allowable working pressures for Tube-Turn welding fittings and for pipe of the same or equivalent material have been computed in accordance with this new formula. These tables will be made available to those having particular interest in piping design.

While thicknesses given by the above formula are theoretically ample to take care of both bursting pressure and material removed in threading, when steel pipe is *threaded* and used for steam pressures of 250 psi and over or for feedwater pressures of 100 psi. and temperatures of 220 Fahr. and over, it is required by both the codes to be seamless and of a weight equal to "extra strong" in order to furnish added mechanical strength. The Boiler Code refers to Schedule 80, but the intent is to require the equivalent of "extra strong" in both codes where pipe is threaded.

## Provision for Thermal Expansion

The need for providing flexibility in pipe lines so that the changes in temperature from room temperature to operating temperatures will not cause excessive bending stresses or troublesome reacting forces and moments is quite generally appreciated.

Numerous methods of analyzing the flexibility of piping systems are available to the piping designer. The merits of the various methods have been discussed at some length in a series of articles which have appeared during the past year in the magazine, *Heating, Piping and Air Conditioning.*

In many cases, natural directional changes in a boiler steam lead, for example, are adequate to care for temperature changes. In some instances, extra loops, turns, etc., are included in a layout which would not be needed if a more detailed study of the proposed line were made.

The usual penalty for inadequate provision for thermal expansion is difficulty in keeping one or more flanged joints tight, particularly in the initial operation of the plant. Excessive bending stresses arising from constraint of thermal elongation relieve themselves through creep or yielding of the portions of the line having the highest bending stresses. This tendency of a steam line to adjust itself to a shape of lowered stress is an important factor in the successful operation of steam lines. Unless the provision for expansion is entirely inadequate, this relaxation of the over-stresses line is only evident where a joint is taken apart for some reason. The difference between the deflection corresponding the stress which the pipe material could maintain at the operating temperature and the actual stress imposed will show up as an addition to the cold-spring or pre-spring applied to the line.

It is customary to cut all pipe lengths for high temperature service short by 50 to 60 per cent of the computed thermal expansion and spring the pipe into place. English practice and that advocated by some designers in this country is to cut the pipe short 100 per cent of the computed expansion. It can be demonstrated that equalizing the stresses in the cold and hot conditions by providing pre-spring in the neighborhood of 50 to 60 per cent results in a more economical design than one based on 100 per cent cold-spring. In addition to increasing the total length of pipe required, the practice of cold-springing 100 per cent has other disadvantages. This practice results in the absence of bending stress at the operating temperature and increases the need for sway braces, vibration dampeners, etc. The behavior of such an unstressed line is somewhat analogous to that of an unstrung bow.

Even with 100 per cent cold-spring the Code for Pressure Piping requires that the stresses at the operating temperature be computed on the basis of a maximum of two-thirds of the calculated expansion. However, the full amount of the cold-spring must be taken into account in considering the forces, moments and stresses acting in the cold condition.

Throughout engineering considerations of cold-spring there is a justifiable reluctance to take full credit for it. Although it is theoretically easy to provide any desired amount of cold-spring, field checks of closing joints often show that none has been obtained. In three-dimensional layouts this loss of cold-spring may be due to swiveling at flanged joints or inability to secure the necessary accuracy in lining up the bends and other pipe elements. For example, a 1-degree variation in lining up a 20-ft. length of pipe will nullify 4 inches of pre-spring allowance that was intended to be provided at right angles to the 20-ft. length. It requires extremely close supervision and care in selecting closing welds or bolted joints to insure that the designed cold-spring actually is obtained. Uncertainties of this nature are responsible for the neglect of cold-spring credit by many organizations in making their flexibility calculations.

The manufacturers of turbines, boilers, pumps and other equipment frequently specify allowable thrusts at connections to their equipment. These allowable forces in general are understandably quite low since, from the equipment manufacturer's standpoint, there is no reason to complicate operating problems.

Current methods of checking whether the actual thrusts are within the specified limits are rather inadequate. The author proposed in a discussion of Dr. Hovgaard's 1937 paper ("Further Studies of Three Dimensional Pipe Bends," Trans., ASME, Vol. 59, FSP59-13) that a separate calculation be made of the relation between force and deflection for the pipe line with one end free. This condition exists before connecting to equipment. A force applied to the free end would enable a direct check of the actual and computed flexural properties of the entire line with supports, braces, etc., to be obtained. A more practical method in some cases would be to make separate computations for the portions of the line on each side of a closing joint and measure the force required to produce a given deflection. If the relation between deflection and force for each portion of a line with one end free were measured in this way, and if it agreed with the calculated relation, there should be good assurance that the computed forces and moments for fixed end operating conditions also would be as calculated.

## Summary

This article has been confined to a brief comparison of operating conditions in central station and paper mill power plants from the standpoint of the usual pressure and temperatures employed and their similar need for continuity of service.

The selection of pipe materials has been discussed at some length with respect to type of pipe, grade of material, and necessary wall thickness of pipe under different code jurisdictions. Difference of up to 50 per cent in cost of pipe and up to 100 per cent in cost of valves were shown to be possible in piping for the same nominal service conditions.

The need for providing flexibility in pipe lines has been discussed briefly. The close supervision required to insure that cold-spring is secured has been called to attention. And a method has been suggested for checking the actual flexual properties of an entire line as installed against the computed relations of deflection and force.

# Air-Drying of Surface-Sized Sheet at Hammermill

**WALTER G. HENDRICH**[1]
**and**
**J. L. VAN NORT**[2]

▶▶▶ A SINGLE GOAL—that of obtaining in the finished product those values and characteristics which mark handmade or loft dried paper—ruled the engineering of the process and the selection of equipment in setting up for air-drying operations at Hammermill.

Since such qualities depend on the most careful control of the many factors affecting the sizing and drying procedure ("Tubsizing Difficulties," by Walter G. Hendrich, *TAPPI Ass'n Papers*, 1943), intensive study was devoted to every phase of the development program, which consisted of eighteen months of planning, construction and pilot operation.

The equipment is housed in a new building, completely air-conditioned and under positive internal pressure to exclude the outside atmosphere, insuring absolute cleanliness.

Complete facilities for accurate compounding of sizing solutions are installed on the lower level of the building, and a large capacity circulating system with precision temperature control gives perfect regulation of the size bath.

A 12-section Clark-Aiken dryer, with individual filtered hot air circulating systems, permits the uniform drying of the fast-moving web. Moisture apparatus, generating a perfect fog at a rate of from 0.1 oz. of water to one pound per minute under 35 pounds pressure, conditions the paper just before winding.

Carefully selected operators were assigned to air-drying even before the facilities were completed, and received special training as they assisted in setting up.

These measures are indicative of the painstaking engineering represented by the project, and have "paid off" in a superior product which has met and exceeded expectations.

Of particular significance is the integrated electrical drive for the sizing and drying line, which deserves much of the credit for the outstanding strength characteristics of the new "Cockletone Bond," first sheet to be run on the new equipment.

This drive, engineered and manufactured by the Reliance Electric & Engineering Company, provides, first of all, a very sensitive control of tension between the various elements in the line. These tensions can be readily adjusted to the exact values required for processing without undue distortion of the fiber makeup of the web. Such regulation is particularly important in sizing and drying, where the wet sheet is in a plastic state, and the drying sheet is susceptible to veins and wrinkles.

Secondly, the drive offers a wide speed range for optimum production with variable immersion and heating times, and is automatically synchronized at any speed set from a simple push button station.

The drive is based on the Reliance variable voltage system, whereby power drawn from the alternating current plant circuit is fed to a motor-generator, exciter and control combination located on the lower floor level of the new plant. This 105 kw. power unit provides readily controllable d-c. output to drive all the units of the entire air-drying line.

The electrical drive and processing equipment is arranged for straight-through operation, or for operation as

(1) Hammermill Paper Company, (2) Reliance Electric & Engineering Company.

***Fig. 1 (left)—Tub-sizing and air-drying facilities are engineered for high speed operation. The size press in the foreground operates up to 900 fpm, while paper travels through the dryer up to 600 fpm. Of the three control boxes visible on the wall, the central panel controls all functions of the synchronized size line drive. The boxes to the left and right regulate and indicate tensions on the unwind and wet wind reels, respectively . . . Fig. 2 (right)—Compact electrical drive elements power the size line. Tension-regulating motors on the unwind reel (foreground) and wet wind (distance) are 10 hp. d-c units. The size press d-c motor (center) has a 40 hp. rating***

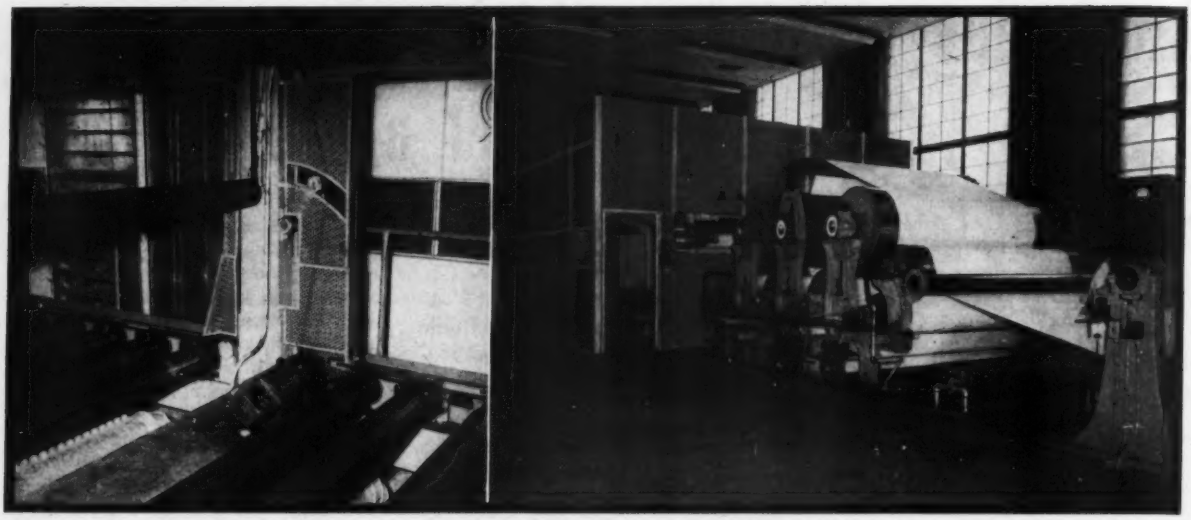

*Fig. 3 (left)—One of the twelve dry loft section motors, this 3 hp. gearmotor rotates all of the section's rolls by chain drive. Speed is electrically regulated by the preceding tension roll (center) to provide proper web tension in the section . . . Fig. 4 (right)—The draw drum section consists of six large rolls which can be steam-heated for special sheet finishing. Moisturizing apparatus permeates the underside of the sheet with fog just before final winding*

two separate units, sizing and drying. In the case of "Cockletone Bond," the units are operated separately. Saturated paper delivered from the size tub is wet wound and stands for an interval in "wet pack" before drying. This procedure enhances the uniformity of our coverage and penetrations before drying. Where proper size penetration to produce the desired sheet finish can be obtained without wet-pack conditioning, the straight-through arrangement is used. All sections are then in range, under proper tension control, with the exception of the wet winder, which is bypassed. Either method of operation is chosen by the operator, who merely sets a selector switch on his panel.

In the size line, the first drive element is a feeder motor on the base paper unwind stand. This motor is primarily concerned with the tension in the paper being delivered to the size tub, and can operate to establish positive, minus, or zero tension in the web, as required.

A conveniently located tension indicator and regulator station permits the accurate setting of web tension at whatever value is needed to prevent undue stretching and weakening of the paper in the tub.

The size press motor is the second element in the size-line drive and governs the actual speed of production, having a speed range equivalent to 150 to 900 fpm travel of the paper.

When tub sizing is being carried on independently of drying, the sized sheet is rewound 35 per cent wet. A motor driving the wet winder then becomes the third drive element. Here again, as in the feeder, tension control is the prime function, and a tension regulator adjusts the winder speed in relation to size press speed to establish the desired tension in the sheet leaving the press. An indicator and control station, as before, provides complete operator control of operating tension over a sizable range.

Sensitive tension control contributes more than the proper values for highest strength characteristics. Proper tension, continually uniform as the roll builds up, also permits the wet

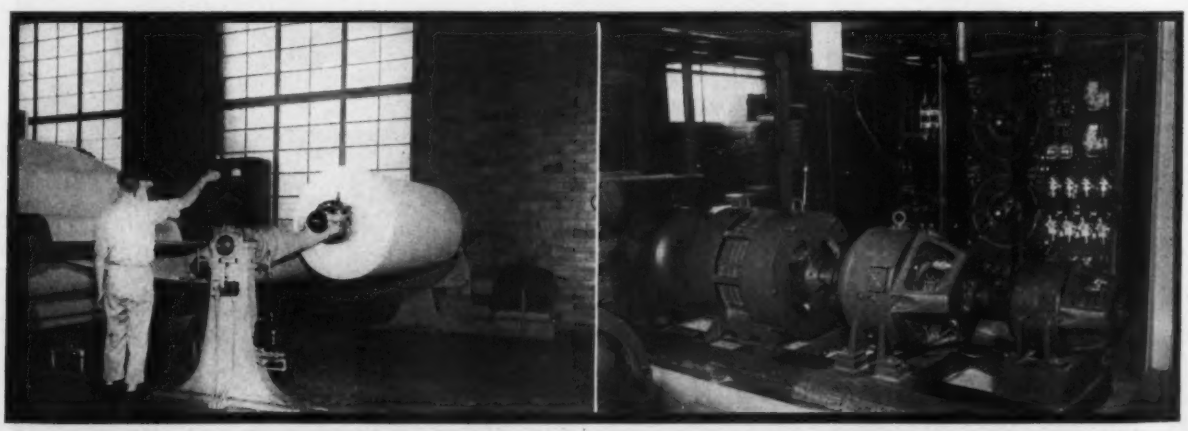

*Fig. 5 (left)—Dry reel speed control and tension indication are at the operator's finger tips. The 10 hp. winder motor at the right, like all of the d-c drive elements, receives variable voltage power from the basement power unit . . . Fig. 6 (right)—On the lower level, a 125 hp., 1200 rpm synchronous motor (second from left) takes a-c power from the plant supply circuit to drive the 75 kw. wet end generator (left), the 30 kw. dry end generator (right) and a direct-connected exciter (extreme right). In the background with doors ajar is the control cabinet for the integrated drive. The motor-driven rheostats respond to push-button actuation at the control stations to vary the generator outputs for adjustable speed operation of the sizing and drying lines. A selector switch upstairs interlocks the two systems for synchronous operation when desired*

reel operator to roll a smooth, even roll. "Cockletone Bond" rolls are regularly wound to 38-inch diameter, representing 5,000 pounds of wet paper. These large, uniform rolls boost production by eliminating considerable splicing, rethreading and down time, and by conserving the operator's energies normally consumed in frequent roll changes.

Operation of the size line is controlled from a nearby panel, which provides functions of *Start*, *Stop*, *Fast*, *Slow*, and *Jog* push buttons, as well as a speed indicator. Holding down the *Fast* and *Slow* push buttons actuates a motor-driven rheostat which governs the voltage supplied to the three size line drive elements from the power unit. Smooth acceleration or deceleration anywhere within the broad speed range takes place as long as the respective buttons are actuated.

The low speed of 150 fpm is used for threading, while actual production may be anywhere in the 200 to 900 fpm range. Variable speed makes possible the delicate regulation of the time of immersion in the size, and hence controls the degree of penetration and the weight of size deposited, permitting the maximum production of the particular grade of sheet desired.

Jogging is another desirable feature of the integrated drive and is helpful when paper becomes plugged in the rolls. The ability to "inch" under such conditions means speed and safety in clearing the rolls. The jogging function likewise simplifies clean-up and care of the chromium and rubber rolls.

Rolls move from the wet pack stand to the dryer unwind, whence they start the rapid trip through the Clark-Aiken loft. As little as two minutes may be required for travel through the dryer, which consists of twelve sections to accommodate the high line speed.

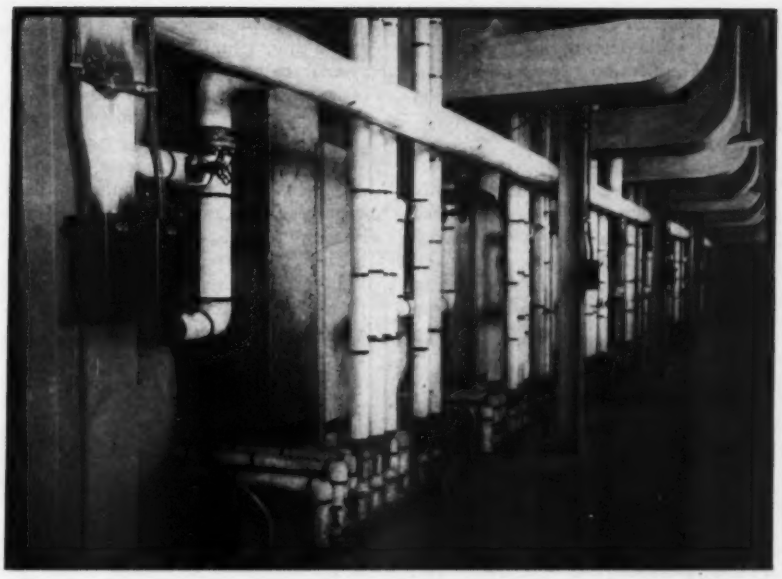

***Fig. 7—An individual motor drives each of the twelve sectional blower systems for dryer air circulation***

Moisture is evaporated at a rate of from 1000 to 2500 pounds per hour as the web shrinks from 94½ inches wet to 90½ inches dry.

Each of the twelve dryer sections consists of thirteen rolls, chain driven by a section motor, and a dancer roll; paper travel is 90 lineal feet per section.

The twelve motors are controlled from a central panel with *Start*, *Stop*, *Fast*, and *Slow* buttons, speed indicator and voltmeter. Synchronized operation is effected anywhere in the 0 to 600 fpm range.

Tension roll rheostats signal the dry end section motors adjusting their individual speeds so that tension in the sheet is continuously controlled throughout the length of the dry loft. Tension control is just as important here as in the sizing line, as proper drying, similar in some respects to metal annealing, must permit indi-

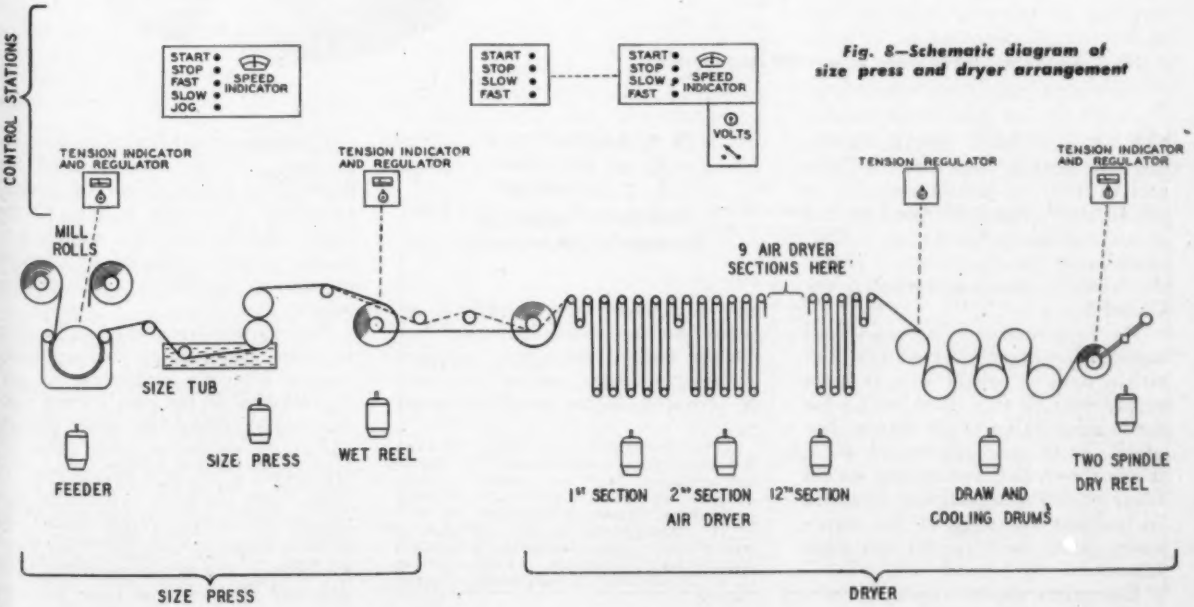


***Fig. 8—Schematic diagram of size press and dryer arrangement***

vidual fibers to assume an unstressed position while setting in the drying sheet. The sectional tension system, which measures and regulates tension every 90 feet, eliminates undue stressing.

Typical of the flexibility of electrical systems, where units need only be joined by wires and can be located anywhere, a secondary dryer control station with *Start*, *Stop*, *Fast*, and *Slow* buttons is located at the wet end of the dryer for added ease of setup and operation.

Leaving the dryer, the web passes over a draw drum, where a motor with a separate control station again controls tension in the web leaving the dryer, giving a predetermined "lead" on tension throughout the machine.

The draw drum is one of six large diameter rolls which—though not used in processing "Cockletone Bond"—may be steam heated for an "ironing" effect in finishing certain types of paper.

In passing to the dry reel, the web passes over moisture apparatus designed by Spray Engineering, which can generate as much as 200 pounds of water per hour in the form of fog, to condition the paper for special use requirements.

The dry reel windup stand is also powered by a motor equipped with tension regulator and control, important to winding a uniform roll without endangering the cockle and without side-slippage. This reel is a two-arm, airclutch rotating-type unit, permitting transfer of the sheet from the fully wound roll to the empty coil "on the fly."

# Agricultural Residue Fibers for Gas Mask Filters

*Fig. 1—Coniferous wood alpha pulp x 200 magnifications*

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**Northern Regional Research Laboratory**[4]

▶▶▶ A SUITABLE MASK already had been designed when, in the latter part of 1941, it seemed desirable, as part of the National Defense Program, to make plans for producing a sufficient number of gas masks to supply the whole civilian population of the United States.

The large number of masks involved required large quantities of raw materials, some of which were in short supply because they were needed for use in other phases of the defense program. After some preliminary work, it was shown that agricultural residue fibers offered a satisfactory economic replacement for some of the scarce, costly fibers used in the gas mask filters.

Gas masks consist essentially of a gas- and vapor-tight headpiece, an outer filter to remove the small but discrete noxious particles or droplets of fumes or smokes, and an inner layer of activated, highly absorbent material to remove the harmful gaseous ingredients of the contaminated air drawn into the headpiece by normal breathing. The filter portion of the mask must be relatively strong, permeable to air, unaffected by changes in relative humidity, and light in weight.

Filters made from wood alpha pulp or from cotton linter pulp are satisfactory from the standpoint of permeability to air, but they are not suitable for retaining the small discrete particles of smokes or fumes unless exceptionally thick and bulky layers of these fibers are used. This is because the meshes formed by the interlacing of such long and relatively thick fibers are large in any one plane of the filter pad, and the smoke or fume particles

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**TABLE 1—Summarized Per Cent Yields of Crude, Screened, Bleached, and Alpha Pulps From Rice Straw and Barley Straw**
***(All values are on basis of original oven-dry material)***

| Straw | Rice | Barley |
|---|---|---|
| Crude pulp | 52.4 | 45.3 |
| Screened pulp | 32.9 | 30.8 |
| Screenings | 1.9 | 2.3 |
| Fines | 17.6 | 12.2 |
| Bleached pulp | | |
| Basis screened pulp | 90.9 | 90.2 |
| Basis straw | 28.9 | 27.8 |
| Alpha pulp | | |
| Basis bleached pulp | 73.0 | 70.9 |
| Basis screened pulp | 65.8 | 64.0 |
| Basis straw | 20.9 | 19.7 |

**TABLE 2—Analysis of Alpha Pulps in Per Cents**

| Constituent | Alpha pulp | | |
|---|---|---|---|
| | Rice straw | Barley straw | Wood |
| Ash | 5.2 | 0.3 | 0.3 |
| Silica ($SiO_2$) | 4.3 | .... | .... |
| Alpha-cellulose (ash-free) | 92.4 | 95.0 | 94.4 |
| Pentosans | 6.0 | 4.9 | 4.2 |
| Lignin | 1.8 | 0.5 | 0.2 |
| Copper number | 0.3 | 0.2 | 0.5 |

cannot be entrapped or retained in the pad unless numerous planes or layers are used to provide long, tortuous paths for these particles. Furthermore, the total area of the adsorptive cellulose surfaces exposed to the contaminated air is relatively small on account of the fairly large diameters of these fibers.

It is well known that a mixture of long and short fibers felted into a sheet or pad will result in a more uniform product with smaller and more uniform spaces between the fibers. It is also known that short thin fibers are better suited for this purpose than short, thick fibers. The scarcity and relatively high cost of these short, thin fibers, plus the fact that this material was required in other phases of the defense program, caused the Department of Agriculture to search for other sources of thin fibers. This problem was assigned to the Northern Regional Research Laboratory of the Department.

A survey of the relative sizes of various agricultural residue cellulose fibers and of their availability in sufficiently large quantities indicated that rice straw or barley straw fibers might meet the necessary specifications. (*1*) Small samples of barley and rice straw alpha pulps (prepared by cooking with caustic soda, bleaching the resultant pulp and treating the bleached pulp with caustic soda of mercerizing strength) were prepared to test the effectiveness of these fibers in smoke and fume retention. Because of encouraging results from the tests, it was decided to produce sufficient quantities of these agricultural residue fibers to make semicommercial runs of the filter sheet on a paper machine.

Approximately 100 pounds each of rice straw and barley straw alpha pulps were prepared. The straws were cooked with 15 per cent caustic soda for two hours at 170 C., washed and screened through a 4-cut (0.004-inch slots) laboratory flat screen. The screen effluent was flowed over an inclined 100-mesh wire cloth to remove the finest fiber fraction. The accepted screened pulp was bleached in three stages: chlorination at 4 per cent consistency and room temperature; treatment with 2 per cent caustic soda (basis pulp) at 4 per cent consistency and 50 C. for 1 hour; and final bleaching with calcium hypochlorite at 4 per cent consistency and 35 to 40 C. for two hours. The total chlorine required for rice and barley straw pulp was 4 and 4.5 per cent, respectively, on basis of oven-dry pulp. The bleached pulp was finally treated with a 12 per cent caustic soda solution for 1.5 hours at 6 per cent consistency.

The yields, of crude, screened, bleached and alpha pulps are summarized in Table 1. (Since only small laboratory equipment was available at the time this work was conducted, a large number of cooks were made and the pulps blended. The yields reported are low, owing to the necessity for producing these pulps as rapidly as possible without first determining the necessary conditions for optimum yields.) The compositions of the rice and barley straw alpha pulps and of the coniferous wood alpha pulp used in the commercial production of the mask filters, are given in Table 2. It may be noted that all of the alpha pulps still contained fair amounts of pentosans, and that the rice straw product contained 5.24 per cent ash, mainly silica.

Hand sheets were made from these individual alpha pulps and from various mixtures with the wood alpha pulp. These sheets (approximately 80 pounds, 25 in. x 40 in.—500) were made by the hand-dip method, pressed only enough to be couched off onto a felt, air-dried, and seasoned at 70 Fahr. and 50 per cent relative humidity. They were then tested for porosity with the Gurley densometer, determining the time required for 500 ml. of air to pass through 1 square inch area of five thicknesses of the sheet. The results, given in Table 3, show that up to 40 per cent of rice or barley straw alpha pulp may be used with wood alpha pulp with but little reduction in permeability of the sheet to air. The inconsistency in the permeability of the 40 per cent rice straw sample is probably due to the difficulty of obtaining uniform sheets by the hand-dip method.

The considerable reduction in size of the open meshes in the sheets made from the pulp mixtures is shown in the accompanying photomicrographs (Figures 1, 2, 3), which were taken of thin sheets prepared for this purpose. These photomicrographs also indicate the greatly increased cellulose surface areas, available for adsorption, produced by mixing the very thin agricultural residue fibers with the relatively thick wood fibers. A recent

**TABLE 3—Porosity of Agricultural Residue and Wood Alpha Pulps and Their Mixtures (Gurley Densometer)**

| Pulp | Porosity of 5 sheets | Ream weight .25x40 500 lb. | Porosity basis 90-lb. ream weight |
|---|---|---|---|
| | Seconds | Pounds | Seconds |
| Wood alpha— | 4.4 | 90.0 | 4.4 |
| + 20% rice alpha | 3.7 | 76.5 | 4.3 |
| + 40% rice alpha | 5.9 | 82.7 | 6.4 |
| + 60% rice alpha | 4.1 | 71.1 | 5.2 |
| + 80% rice alpha | 4.8 | 70.1 | 6.2 |
| + 100% rice alpha | 5.2 | 67.6 | 6.9 |
| + 20% barley alpha | 4.4 | 82.1 | 4.8 |
| + 40% barley alpha | 4.3 | 78.8 | 4.9 |
| + 60% barley alpha | 5.5 | 78.4 | 6.3 |
| + 80% barley alpha | 6.0 | 80.8 | 6.6 |
| + 100% barley alpha | 7.3 | 82.2 | 7.9 |

*Fig. 2—Mixture of 60 per cent coniferous wood alpha pulp and 40 per cent rice straw alpha pulp x 200 magnifications. (Note the greatly decreased pore size due to the addition of the thin-fibered pulp)*

article by J. J. Perot, Jr.,(2) showed that retention of smoke particles by fibrous filters increases in efficiency with decrease in diameter of the fibers.

The prepared rice straw and barley straw alpha pulps were shipped to a paper mill where they were mixed with cotton linter pulp and made into a filter sheet on a 20-in., 2-cylinder machine at 300 fpm. Smoke and fog retention tests on this commercial product were satisfactory and compared favorably with the results obtained with the scarce extra-fine fibers previously used.

## Conclusions

Rice straw and barley straw alpha pulps in admixture with cotton or

# Technical Reports

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**University of Akron**

▶▶▶ THE PREPARATION OF crystal-clear technical reports is the most effective way in which the chemist and engineer can call the attention of management to his abilities and accomplishments. This applies to the paper industry as well as many others. Facility in writing such reports is as important as a good working knowledge of pulp and paper mill practice, the ability to devise and maintain mill control methods, aptitude in technical service work, and tact in the handling of men.

Few colleges and engineering schools supplement the required work in English with adequate courses in report writing. Chemists and engineers often find it easier to carry out or supervise an investigation than to write about the completed project.

The following discussion covers a few basic facts concerning the preparation of technical reports.

Research and engineering reports usually fall under the headings of "preliminary," "progress," or "final," as determined by the status of the investigation. In a preliminary report, the author should outline his objectives, describe the proposed experimental procedure, and state the use he expects to make of the data to be obtained. A progress report informs the reader as to significant accomplishment and a final report presents all data, properly amplified with a discussion of results and statements of conclusions and recommendations.

## Essentials of a Technical Report

For best results, final reports should be prepared with close attention to ten essential subdivisions:

Cover
Title
Table of Contents
Abstract
Introduction
Experimental Work
Discussion of Results
Summary
Bibliography
Appendix

### Cover and Title

The cover of a technical report should state the title, name of the author, his department, the job number, the date and the name of the company. The title, which should reflect the scope of the project, should be informative but brief and explicit. In the case of a lengthy, comprehensive report a short main title can be supplemented to advantage by a slightly longer subtitle.

### Table of Contents and Abstract

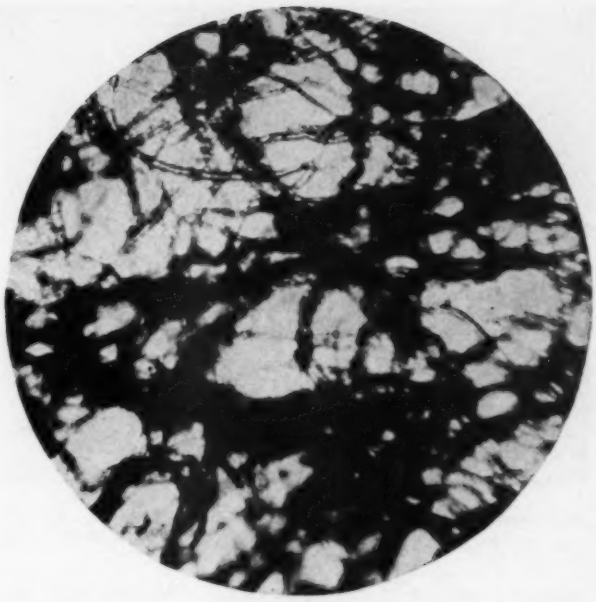
A table of contents takes the place of an index and should embody the main and secondary headings with the corresponding page numbers. The abstract constitutes the first portion of the text and should provide the reader with a terse condensation of the summary since it is often the only part of the report to be read by busy executives. Detail and explanatory material are omitted and attention is focussed on conclusions and recommendations.

### Introduction

Though the introduction follows the abstract, readers who are going to be closely concerned with the report prefer to start perusal with the introduction. A good introduction (1) states the names of those who have authorized the investigation and the attendant circumstances, (2) outlines the purpose and scope of the project, (3) provides definitions of new and unfamiliar terms, (4) presents an account of previous work in the field together with the names of earlier investigators, and (5) develops sufficient theory so that the reader may be thoroughly grounded.

The critical reader wants to know why the investigation was undertaken and he expects a definite statement of its purpose and limits and a clear ac-

*Fig. 3—Mixture of 60 per cent coniferous wood alpha pulp and 40 per cent barley straw alpha pulp x 200 magnifications. (Note the greatly decreased pore size due to the addition of the thin-fibered pulp)*



coniferous wood alpha pulp produce a gas mask filter medium more impermeable to smoke and fume particles and droplets, without substantially changing the permeability of the medium to air, than does a medium made of cotton or wood pulp alone.. These results give a good illustration of the applicability of the properties of agricultural residue fibers to perform a function not so easily attained with other plant fibers.

### Literature References


(1) Lathrop, E. C., and Aronovsky, S. I., U. S. 2,372,437, March 27, 1945.

(2) Perot, J. J., Jr., *Paper Trade J.*, 124, No. 25, 54 (June 19, 1947).


count of the meaning of words used in special senses. He also feels entitled to enough theory so that he can understand the experimental procedure and discussion of results.

### Experimental Work

An adequate account of the experimental work done in connection with a project entails coverage of (1) apparatus and equipment, (2) materials, (3) test procedure, and (4) data. Special equipment should be described but standard equipment should be identified by name and manufacturer's number. Materials should be stated and amplified by specifications where desirable. Test procedures should be couched in the imperative or indicative mood and every effort should be made to present the data in convenient tabular and graphical forms.

### Discussion of Results

The discussion of the results of the investigation, in many ways the meatiest and most important part of the report, usually requires attention to several or all of the following features: (1) a further presentation of theory, (2) an account of particularly involved experimental work, (3) a statement of the meaning and importance of the data, (4) an analysis of actual and possible experimental errors, (5) a delineation of sample calculations, (6) an explanation of deficiencies, if any, in the experimental work, and (7) suggestions for further studies.

Only such theory as is necessary to interpret the data belongs in the discussion of results; detailed and complex theory of supplementary importance should be placed in the appendix. Involved experimental work should be described carefully and incisively and clear statements of the significance of the data should be included. Sample calculations are essential and a dignified analysis of errors and deficiencies strengthens rather than weakens a report. Conservative suggestions for further work are always in order.

### Summary

The summary represents the last chance for the author to clinch his thesis. It should be devoted to a complete account of the important results, conclusions and recommendations and is often presented in the form of short, numbered statements. It is the source material from which the abstract, which opens the report, is drawn.

### Bibliography

Nearly every report requires a list of literature references. These should be numbered in alphabetical order and should include the names of the author and the journal of publication together with the volume and page numbers and the year. In the case of a book, the title, publisher and city of publication are also included. Patents require the issue number and the name of the concern to which the patent has been assigned.

### Appendix

Many long reports require an appendix in which are placed glossaries, mathematical derivations, calibration data and supplementary calculations. Such material is not essential to an understanding of the report, yet it should be available to those who may wish to repeat the work.

### Working Suggestions

In preparing a technical report it is well to arrange the material on file cards, each properly headed with a topic. Such cards can be arranged and rearranged until a logical sequence is attained. One of the entries on a particular card frequently suggests a strong topic sentence for the paragraph in question and the others serve as structural outlines.

The first draft should be written or dictated with constant reference to the cards. If this draft progresses smoothly it is well to write or dictate rapidly, concentrating on a flow of ideas rather than on finished expression. This draft should be set aside for a day or two and then revised under the cold scrutiny of considered afterthought.

Technical writing is not easy but anyone capable of carrying out an investigation to its completion can achieve satisfactory reports, with practice, through attention to logical presentation of material as it pertains to the ten essentials of organization.

# Paper Mills Use Power Lift Trucks To Advantage

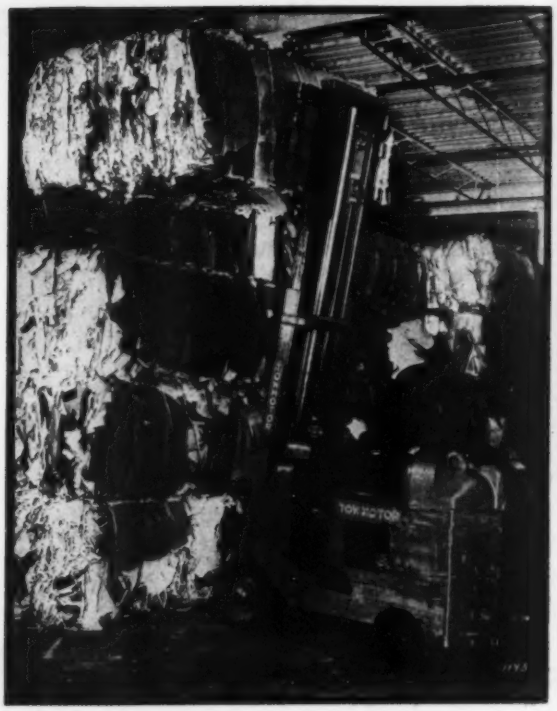


*Fig. 1—Stacking 1,300-pound bales of wastepaper four high to conserve storage space*

**FRANCIS A. WESTBROOK, M.E.**

▶▶▶ THE USE OF gasoline-powered fork-lift trucks has been found by several concerns in the paper industry to be a substantial aid in making full use of available storage space by stacking, in handling raw materials and finished products, in saving manpower and in moving materials from one production process to another. Consideration of how two Wisconsin concerns make use of such handling equipment will illustrate how important it can be.

John Strange Paper Company, of Menasha, Wisconsin, a manufacturer of chipboard, kraft and sulphite wrappings, test liners, and specialties, had to increase its output by 180 tons of paper products per day. This increase in output meant more storage of both raw materials and finished products, and more movement of all kinds of materials in and out of the plant and between production operations to maintain continuous operation of the machinery.

The average daily incoming shipment of raw materials at the mill consists of four carloads of wet kraft pulp and ten carloads of baled waste paper. Each bale of wastepaper weighs from 1300 to 1350 pounds.

There is a six-car freight dock at the mill for receiving. Formerly, in order to keep demurrage costs at a minimum, it was necessary to work a crew on Sundays to unload the cars. Now, two men working only part of the day, with power fork-lift trucks, unload the incoming shipments promptly.

With these trucks it is a simple matter to pick up the bales of wastepaper, run them into the storage space, and stack them neatly four high (Figure 1). This stacking of the bales greatly

*Fig. 2 (left)—Entering box car with roll of paper . . . Fig. 3 (right)—Stacking pallet-loads of bags three high. Bags contain resin*

*Fig. 4 (left)—Transporting 4,400-pound tank of chlorine on fork-lift truck . . . Fig. 5 (right)—Picking up half ton of wastepaper with scoop attachment on power fork-lift truck*

increases storage capacity without increasing the floor area used for the purpose.

When wastepaper is needed for processing, the bales are removed from storage and transported to and dumped directly into Hydrapulpers. This method of mechanical handling, in addition to saving time, has eliminated a serious source of injury to employees because of heavy lifting.

The fork-lift trucks also are used to take the finished rolls of paper to storage as they come off the paper machines. Here they are stacked horizontally on top of each other. Some rolls are 96 inches long, 50 inches in diameter; and weigh up to 4000 pounds.

Rolls are taken from storage to fill orders by the same trucks. They are first weighed and are then run directly into a box car (Figure 2). The length of the average trip is 185 feet. Such a trip is completed in less than two minutes, including time spent in weighing.

It has been possible to double the number of rolls placed in a box car with the help of the fork-lift truck, due to its stacking power and maneuverability. The practice is to first place two rolls in one end of a car and to nest a third roll on top. Four rolls are then placed on the floor at the other end of the car with three nested on top. Finally, a sloping plank is used to roll more rolls into the vacant space in the second tier. In this manner, 16 rolls, weighing some 4000 pounds each, are loaded into a box car in 30 minutes. Fifty foot box cars will hold 18 such rolls.

Many shipments are made by motor truck. The power fork-lift trucks are used to transport rolls of finished paper from storage and place them directly on these trucks. In this way, three 2200-pound rolls and two 1800-pound rolls are loaded in 15 minutes by two men. Without the fork-lift trucks, it used to take five men nearly 30 minutes to do the same job.

Hummel & Downing, Milwaukee, Wisconsin, also has realized important gains in materials handling costs, from the use of power fork-lift trucks. This concern, a manufacturer of paper and paper containers, uses its trucks for much the same purposes as the John Strange Paper Company. However, there are distinct variations in local conditions and practices.

Production operations at Hummel & Downing are carried on in a four-story building with one complete production line on each floor. There are two storage points—one for raw materials in a yard, and one for finished products in a large warehouse. This layout calls for six handling systems, each of which must be usable for the handling of a diversity of materials in a wide range of shapes from pallet loads of adhesives in bags to tanks of chlorine weighing 4400 pounds.

Gasoline-powered fork-lift trucks are very desirable for the continuous service required here, much of which is outdoors in all kinds of weather. The raw materials handled include wastepaper, wet pulp, strawboard, resins, sizing, starches, adhesives and many chemicals. These materials are delivered in bags, drums, bales, laps and rolls and even in bulk.

Handling wastepaper in bales has been greatly increased in efficiency. For example: one of the fork-lift trucks picks up and carries two bales weighing in all 2230 pounds a distance of 80 feet in less than a minute.

All of the raw materials are stacked in the storage space allotted to them in multiple tiers so as to make as efficient use of the space as possible. Figure 3 shows pallet loads of bags of resin being stacked three high. Figure 4 shows how a 4400-pound tank of chlorine is handled; Figure 5 wastepaper in bulk dumped on the receiving dock. In the latter case, the truck has been provided with a special scoop attachment which is rammed into the pile of paper, picks up half a ton or more, and takes it to the baling machines where it is dumped directly into the hoppers. This practice represents an important saving in time and labor over the former manual handling.

To pick up a 3000-pound roll of paper in a freight car and deliver it to storage takes 46 seconds. In another case, five 400-pound bales of kraft are carried 190 feet and placed on a waiting motor truck in 2 minutes and 32 seconds. In another department, a power fork-lift truck, provided with a guard for protection of operator against falling objects, is used to stack wooden skids loaded with white coated board. A skid load in this case amounts to about 4500 pounds.

The truck with the scoop attachment, used for handling wastepaper in bulk, also is employed at times to plough an emergency path through the snow.

The applicability of gasoline-powered fork-lift trucks in pulp and paper mill service, as revealed by these two case studies, is limited mainly by the imagination and ingenuity of the mill superintendent, plant engineer, master mechanic, or anyone else in a mill organization concerned with materials handling problems.

# Paper Standardization

## as an Aid to the Printer

**M. S. KANTROWITZ[1] and E. W. SPENCER[2]**

▶▶▶ THE MERITS OF standardization need no defense. Its practicability in all fields of manufacture is well proven and needs only to be practiced. However, standardization brings economies only in proportion to the wisdom with which it is applied. Standards should be set up when it becomes clear that by doing so, important economies or simplified operations will result.

The standardization of paper is a subject of decided interest to printers, paper manufacturers, and purchasing agents. Although much has been said and written about standardization for paper and attempts have been made to attack the problem, no concerted action has been taken. National standards of paper will be adopted only as the result of constant demand from paper consumers.

Paper and paper products are themselves the chief raw material for the printing industry.

In the printing industry we find that except for the Government Printing Office and a few large buyers of paper, technical specifications are not used to an appreciable extent in the purchase of paper. On the other hand, the papermaker has definite specifications for his raw products. He buys clay, lime, soda ash, and even pulp on definite specifications. In these days of high speed and mass production, it is difficult to understand why the paper industry, which produces the printer's chief raw material, is one of the few large industries which has not as yet shown progressive trends towards standardizing its products on the basis of definite quality specifications with relation to its uses. Until such standardization has been accomplished, the printer is necessarily handicapped in his selection of paper for any given printing purpose by lack of knowledge of the basic qualities of the many papers offered for the same purpose by different manufacturers. The printer is not interested in papermaking methods or practice, but only in paper as a finished product and its suitability for various purposes. Paper standardization to him means a plan which will effect economy and maximum efficiency in the use of paper in the printing industry as a whole.

The correct use of paper sometimes has been disregarded. Forms or blanks of equal importance as records, subject to the same handling, have been printed on papers ranging from the highest grade of bond to a common wrapping paper. Not only is this an economic loss to both the printer and his customer, but it also causes unfair competition among printers. To overcome this condition, it is necessary that the printer be better acquainted with the qualities of the various papers on the market. The printer is in need of a yardstick for measuring paper qualities and a standard method of tying up these qualities with the use requirements of the job on hand. Paper standardization includes size, weight, quality, and packaging.

### Sizes of Paper

The Division of Simplified Practice, U. S. Department of Commerce, through a series of conferences arrived at a program for simplification and standardization of sizes of certain grades of paper. The sizes covered by this standardization and published in Simplified Practice Recommendation No. 22 (latest issue R22-40) are shown in Table 1.

These were selected from a large number of sizes as being the basic ones on which the major portion of printed work could be done economically. However, some necessary sizes were omitted, particularly 21 by 32 and its double, in bond and writing papers, although the United States Government for many years has used 8 by 10½

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**TABLE 1—Paper (Basic Sheet Sizes)**
**(All sizes are given in inches)**

**Bond and Writing Papers**

*Rag content or sulphite*

| | |
|---|---|
| 17 by 22 [1] | 24 by 38 |
| 17 by 28 | 28 by 34 |
| 19 by 24 | 34 by 44 |
| 22 by 34 | |

**Ledgers**

*Rag content*

| | |
|---|---|
| 14 by 34 [2] | 19 by 48 |
| 16 by 21 | 20 by 28 |
| 17 by 22 [1] | 21 by 32 |
| 17 by 28 | 22 by 34 |
| 17 by 56 [2] | 23 by 36 |
| 18 by 23 | 24 by 38 |
| 18 by 46 | 27 by 40 [2] |
| 19 by 24 | 28 by 34 |

*Sulphite*

| | |
|---|---|
| 17 by 22 [1] | 22 by 34 |
| 17 by 28 | 23 by 36 |
| 18 by 23 | 24 by 38 |
| 19 by 24 | 28 by 34 |
| 21 by 32 | |

**Loose-Leaf Ledgers**

*Rag content or sulphite*

| | |
|---|---|
| 22 by 34 | 22½ by 34½ |
| 22½ by 22½ | 24½ by 24½ |
| 22½ by 28½ | 24½ by 28½ |

**Machine-Posting Ledgers**

*Rag content*

| | |
|---|---|
| 17½ by 22½ | 24½ by 24½ |
| 19½ by 24½ | 24½ by 28½ |
| 22½ by 22½ | 24½ by 36½ |
| 22½ by 34½ | 24½ by 39 |

**Book Papers [3]**

*Uncoated*

| | |
|---|---|
| 22½ by 35 | 32 by 44 |
| 24 by 36 | 33 by 44 |
| 25 by 38 [1] | 35 by 45 |
| 28 by 42 | 36 by 48 |
| 28 by 44 | 38 by 50 |
| 30½ by 41 | |

*C2S (coated two sides)*

| | |
|---|---|
| 22½ by 35 | 28 by 44 |
| 24 by 36 | 32 by 44 |
| 25 by 38 [1] | 35 by 45 |
| 26 by 40 | 36 by 48 |
| 28 by 42 | 38 by 50 |

*C1S (coated one side) or label*

| | |
|---|---|
| 20 by 26 | 32 by 44 |
| 25 by 38 [1] | 35 by 45 |
| 26 by 40 | 36 by 48 |
| 28 by 42 | 38 by 50 |
| 28 by 44 | 41 by 54 |

*Offset*

| | |
|---|---|
| 22½ by 35 | 36 by 48 |
| 25 by 38 [1] | 38 by 50 |
| 28 by 42 | 38 by 52 |
| 28 by 44 | 41 by 54 |
| 32 by 44 | 44 by 64 |
| 35 by 45 | |

**Index Bristol**

20½ by 20¾
22½ by 28½
25½ by 30½ [1]

**Cover Paper**

| | |
|---|---|
| 20 by 26 [1] | |
| 23 by 35 | |
| 26 by 40 | |
| 35 by 46 [4] | |

[1] Basic size
[2] Stocked only in 100-per cent rag
[3] The book paper sizes listed are those usually carried in stock by paper merchants and paper mills
[4] Plain-coated cover paper only

inches, cut from these sizes, as its standard for letterheads.

Letterheads were standardized by the Permanent Conference on Printing. The conference set 8 by 10½ inches as the Government standard size with the quality not to exceed 50 per cent rag. The adoption of this standard size has resulted in a substantial saving annually to the Government. The number of sizes of envelopes purchased for Government use has also been reduced to a considerable extent. For instance, those purchased for congressional use have been reduced from 12 sizes to 4.

Paper Trade Associations such as the Writing Paper Manufacturers Association and the Book Paper Manufacturers Association have issued compilations of sizes and weights in booklet form entitled "Trade Customs." They are based upon what individual mills have found by experience to be practical and necessary in handling their business. The standard paper sizes adopted by the Writing Paper Manufacturers Association are shown in Table 2.

It is evident that standardization of paper sizes should interest the consumer as well as the producer. It has been of assistance in the simplification of office equipment, press sizes, and paper converting machinery. It has also reduced to a minimum the number of stock sizes carried by manufacturers. The manufacturer can increase the output of these standard items with reasonable assurance that there will be a demand for them. It also helps the purchasing agents in that they are assured a ready supply. They can standardize their forms to match the standard sizes of paper and cut the cost of excess waste due to conversion.

## Weights of Paper

Weights of paper have also been fairly well standardized by the manufacturers. Simplified Practice Recommendation No. 22 included a recommendation that all paper substance weights should be stated in terms of the basic 25 by 40 inch size.

In 1926 the Paper Conference Board, composed of representatives of paper manufacturers, paper merchants, and printers recommended the adoption by individuals and trade associations throughout America that 1,000 sheets become the basis of count and weight. Unfortunately this recommendation was not universally followed.

The Government Printing Office adopted the 1,000-sheet unit count as a standard on March 1, 1927, replacing the previously used 500 sheet ream count, and this unit count has been included in our paper specifications since that date. However, it did not establish the single standard 25 by 40 inches for the basis sheet size for all classes of paper.

The 1,000-sheet basis is a pure decimal basis and thus lends itself to direct mathematical computation and comparison. It is rather easy to shift the decimal point in the price of 1,000 sheets of paper and thus find the cost of 100, 10, or one sheet. Paper is a material of printing which is one of the most important factors in estimating, scheduling, and controlling any printing job and since printing production is often based on the 1,000-unit (such as 1,000 impressions, 1,000 signatures, 1,000 sheets, 1,000 books, etc.), it is very desirable to have all basic paper computations and records maintained in the same common unit. Under this method the printer will receive his paper based on weights and price per 1,000 sheets, the same as he sells his product. It has been stated that the use of this method of count will prevent errors to which printers are subjected because of confusing reams and sheets.

The proposal to establish 25 by 40 inches (1,000 square inches) as the basis of measurement for paper and 1,000 sheets as the standard count has made little headway. Tom G. Fletcher, vice president, Fletcher Paper Company, Alpena, Michigan, on July 12, 1943, at a meeting of the Western Division of the Salesmen's Association of the Paper Industry, advocated the adoption of a plan placing paper weights and counts on a 25 by 40 inch size, 1,000 sheet count basis.

Considerable interest has been manifested by the printing industry toward the standardization of all paper weights on one basic size of 25 by 40 inches (1,000 square inches) replacing about 12 basic sizes now in use, together with the adoption of a 1,000 sheet unit count replacing the 500 sheet or ream count now commercially used.

**TABLE 2—Trade Customs of the Writing Paper Field (Standard Sizes)**

| Rag Content Papers | | Sulphite Paper | |
|---|---|---|---|
| *Bonds and Writing* | | *Bonds, Writings, and Mimeograph* | |
| 17 by 22 | 22 by 34 | 17 by 22 | 22 by 34 |
| 17 by 28 | 24 by 38 | 17 by 28 | 24 by 38 |
| 19 by 24 | 28 by 34 | 19 by 24 | 28 by 34 |
| | 34 by 44 | | 34 by 44 |
| *Ledgers* | | *Ledgers* | |
| 16 by 21 | 19 by 48 | 17 by 22 | 21 by 32 |
| 17 by 22 | 20 by 28 | 17 by 28 | 22 by 34 |
| 17 by 28 | 21 by 32 | 18 by 23 | 23 by 36 |
| 18 by 23 | 22 by 34 | 19 by 24 | 24 by 38 |
| 18 by 46 | 23 by 36 | | 28 by 34 |
| 19 by 24 | 24 by 38 | | |
| | 28 by 34 | | |
| (Additional Sizes made in 100% rag ledger only) | | *Loose-Leaf Ledgers* | |
| 14 by 34 17 by 56 27 by 40 | | 22 by 34 | 22½ by 34½ |
| *Loose-Leaf Ledgers* | | 22½ by 22½ | 24½ by 24½ |
| 22 by 34 | 22½ by 34½ | 22½ by 28½ | 24½ by 28½ |
| 22½ by 22½ | 24½ by 24½ | *Manifold, Onion Skin, and Similar Lightweight Papers* | |
| 22½ by 28½ | 24½ by 28½ | 16 by 21 | 22 by 34 |
| *Machine Posting Ledgers* | | 17 by 22 | 24 by 38 |
| 17½ by 22½ | 24½ by 24½ | 17 by 26 | 26 by 34 |
| 19½ by 24½ | 24½ by 28½ | 17 by 28 | 28 by 34 |
| 22½ by 22½ | 24½ by 36½ | 19 by 24 | 34 by 44 |
| 22½ by 34½ | 24½ by 39 | | |
| *Index Bristol* | | | |
| 25½ by 30½ | 20½ by 24¾ | | |
| 22½ by 28½ | | | |
| *Manifold, Onion Skin, and Similar Lightweight Papers* | | Cover Paper (Regular Sizes) | |
| 17 by 22 | 22 by 34 | 20 by 36 | |
| 17 by 26 | 24 by 38 | 23 by 35 | |
| 17 by 28 | 26 by 34 | | |
| 19 by 24 | 28 by 34 | and multiples thereof | |

On December 13, 1943, one of the features prepared by the Joint Committee on Government Relations of the Commercial Printing Industry in connection with its conservation program was the standardization of paper. It accepted the proposal of Tom G. Fletcher that the 1,000 sheet unit as a basis of count be adopted in place of the 500 sheet (ream) unit and that measurement of the basic size and weights of paper be in terms of 25 by 40 inches instead of the present various accepted basic sizes and weights. The present basis sheet sizes for printing papers are:

Book and offset: 25 by 38 inches or 950 square inches

Bond, Ledger, Manifold and Writing: 17 by 22 inches or 374 square inches

Index bristol: 25½ by 30½ inches or 777¾ square inches

Mill bristol: 22½ by 28½ inches or 641.25 square inches

Blotting: 19 by 24 inches or 45 square inches

Cover: 20 by 26 inches or 520 square inches

Newsprint, Wrapping and Tissue: 24 by 36 inches or 864 square inches

This proposal of the Joint Committee on Government Relations of the Commercial Printing Industry met some opposition but elicited considerable support. The Pulp and Paper Division of the War Production Board, at an industry advisory meeting, rejected the proposal. On January 28, 1944, a delegation of printers under the auspices of the Joint Committee on Government Relations of the Commercial Printing Industry appeared before the Boren-Halleck Congressional Sub-Committee in connection with its paper conservation and standardization program.

At the meeting of this Sub-Committee, on January 28, 1944, a letter from the Government Printing Office endorsing the paper standardization proposal was placed in the record.

This plan proposed the establishment of a common unit of measurement for classifying paper. It did not affect in any way the size of the sheet used by printers and publishers. When first advocated by the Joint Committee on

**TABLE 3—Present and Proposed Basis Weight (in pounds)**

| Present basis weight 500 sheets | Proposed basis weight 1000 sheets | Proposed basis weight (actual) 1000 sheets |
|---|---|---|
| Book ....25 by 38— 70 | 25 by 40—140 | 133.0 |
| Bond ....17 by 22— 16 | 25 by 40— 80 | 30.0 |
| Ledger ...17 by 22— 32 | 25 by 40—160 | 60.0 |
| Index 25½ by 30½—110 | 25 by 40—270 | 210.0 |
| Cover ...20 by 26— 50 | 25 by 40—180 | 93.5 |

Government Relations of the Commercial Printing Industry, the change to a uniform standard had been advanced as a means of saving 5 per cent of paper tonnage as a war conservation measure. The conservation of paper would be accomplished as shown in Table 3.

For example, under the present basis, if a printer purchases 1,000 sheets of 70-pound book paper in size 25 by 38, he will receive 140 pounds of paper. Under the proposed basis the printer purchasing 1,000 sheets of 70 pound book size 25 by 38 will receive 133 pounds of paper, etc.

The implementation of this proposed standard of paper measurement met with opposition by some manufacturers and consumers of paper. They argued that its adoption would necessitate immediate reprinting of all paper catalogues. To gain a pulp saving on newsprint, there would be required a change in our present tariff law regarding certain weights, and during the transition period printing estimators would be in a state of confusion. It was also argued that although the employment of the 25 by 40 inches basic size has its merits as a means of simplifying the computation of actual weights on odd sizes of paper regardless of basic weight, such standardization is overrated in view of the confusion that may easily result. It is stated that basis weight in papers is in ratio to the opacity, strength, finish, and bulk. If the basis weight to a basis size is altered, there is created a completely new set of standards in papermaking that must be met by mills and understood by publishers and users. Another factor is the long use of 25 by 38 inches basis size and multiples thereof in planning book formats. The 6 by 9 inches or 6⅛ by 9¼ inches trimmed sizes are proverbial in printing and publishing circles. Actually a 6 by 9 inches trimmed size can be effected by using a sheet size 24½ by 37 inches, but the 25 by 38 inches sheet size was a compromise to allow ample trim to a 6 by 9 inches size, with allowances for variations in folding, etc.

In April, 1945, the National Paper Trade Association appointed a committee to study the desirability of the 1,000 square inch (25 by 40 inches)—1,000 sheet basis as a yardstick in the paper industry. This committee became known as the Committee on Simplification of Weights and Standards. After detailed study and the preparation of statistical data the Committee issued its report to the membership, copies of which have been widely distributed throughout the paper industry. That plan, designated as the "MM System for Measuring Paper," virtually constitutes a modification of the 1,000 square inch-1,000 sheet unit standard proposed by the Joint Committee on Government Relations of the Commercial Printing Industry. It differs from the latter in that it did not involve a reduction in the basis weight of the various grades of paper.

In view of the widespread interest, it seemed appropriate to consider the desirability of introducing the proposed standardization into Government Printing Office paper specifications. We, therefore, made a survey among contractors and manufacturers furnishing paper to this Office to ascertain their reaction regarding our adopting the 25 by 40 inches or 1,000 square inches as the basic unit size for all grades of paper computation, replacing the various basic sizes now in use. Although many of the replies indicated a favorable trend toward adoption of the proposed "MM" system, those who are opposed advanced their arguments on the basis that the adoption of the proposed standardization would require an educational program for the entire paper industry and that the value of the proposed system would be outweighed by confusion and costly errors.

As a result of this investigation we felt that while the idea itself is a good one, the Government Printing Office should not dictate practices to the paper industry which directly affect their manufacturing procedures and force them to conform by compulsory specifications. It would be far better to work this out by full co-operation with the paper industry and the printers on the basis of a common understanding of each other's problems and a common agreement upon practices.

This article will be continued. Part II will include specifications for the puchase of bond, ledger, and book papers.

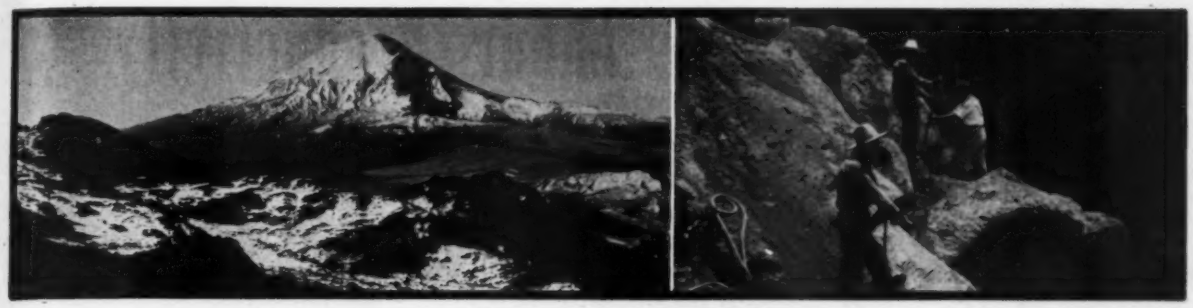


*Fig. 1 (left)—Popocatepetl, Mexico . . . Fig. 2 (right)—Loosening a block of lava stone*

# Basalt for Papermaking Equipment

**CLAY PERRY**

▶▶▶ FOR HALF A CENTURY previous to World War II, manufacturers of papermaking machinery in the United States had been importing lava stone from a quarry at Neidermandig, Germany. Not only did the war during its early days shut off this importation, but also later destroyed the quarry by bombing.

With the shutting off of this supply of lava stone, a new source was located in Italy, but here again the war soon made it unavailable. One engineer for a U. S. manufacturer of paper mill machinery roamed the world in search of a suitable supply. He found lava in Hawaii and in the state of Washington, but these deposits were unsatisfactory. Finally, his search ended in what might seem an obvious place—at the foot of two famous volcanoes, Popocapetl and Ixtaccihuatl, within 60 miles of Mexico City.

An Indian legend, over two thousand years old, still surviving in Mexican folklore, is incorporated in the names of these two volcanoes. Ixtaccihuatl means "The White Woman," from Ixtac, meaning white, and huatl, meaning woman or a princess. Popocapetl means "The Mountain That Smokes," from Popo, meaning that smokes, and Tepetl, meaning mountain, also the Indian name for warrior.

Popocapetl rises 17,900 feet above sea level; Ixtaccihuatl, 17,350 feet.

The lava deposits and quarry at this Mexican location, San Rafael, are owned by a Mexican pulp and papermaking firm.

The present pulp and paper mill at San Rafael, the largest in Mexico, is the outgrowth of a paper mill which began operations there more than fifty years ago.

The site of the quarry and of the pulp and paper mill is at the end of a beautiful canyon formed by the buttresses of the majestic "Sleeping Woman," at an elevation of 8,200 feet. In the background is the western slope of snow-capped Ixtaccihuatl; in the foreground, the extensive, distant panorama of the Valley of Mexico.

The lava stone is quarried entirely by hand. Dynamite may be used to loosen a block that has been shaped by drilling. Often, to prevent injury of the basalt, only steel wedges are used.

Upon the loosening of a block, it is moved from its position by hand to a place where it falls by gravity down the steep slope of cliff to the workyard below.

Three to five days may be required to loosen a block properly. Such a block may vary in size from 4 ft. by 4 ft. by 8 ft. up to 10 ft. by 8 ft. by 10 ft., and weigh up to fifty tons.

In the workyard, blocks of this kind, which have been tested for possible defects in the tumble from their location above, are divided and subdivided by drilling and splitting with steel wedges into sizes for the making of beater rolls, beater bedplates, and kollergang stones. A single improperly placed or struck blow with a hammer in the work of dividing a rough block, may ruin a piece of stone, almost finished. So, chip by chip, the workmen, each of whom must have a thorough knowledge of the texture of the stone, actually sculpture out the rock. Certain pieces must be carried in wet sand so as not to split wrong under the blows of the hammer and cold chisel.

Because of brittleness when unsupported, some of these finished pieces have to be handled almost like glass. At best, many breaks occur in transportation from the quarry to the customer. However, once the stone becomes a part of a finished piece of paper mill machinery, it is almost indestructible.

*Fig. 3 (left)—Shaping a piece of lava stone. Workmen are real artisans, almost sculptors, doing all shaping by hand . . . Fig. 4 (center)—Rough blocks and finished pieces of lava stone . . . Fig. 5 (right)—A basalt "stone" shaped roughly by hand. Protuberances will be removed, making a perfect cylinder*

# How to Increase Labor Productivity

**JOHN D. CORRIGAN**
**Corrigan, Osburne & Wells, Inc.**

▶▶▶ EVERY OPERATION in a pulp and paper mill has its corresponding expense. Therefore, in a cost reduction program it is essential to consider every operation in the light of its costs. Unnecessary operations are a waste of time, energy, and money. When waste is eliminated, costs are automatically reduced.

Successful management has found that the answer to the establishment of proper costs is based on a constant and unceasing search to improve operations. There is no magic method; there is no one problem. It is a series of problems which when dealt with separately and then co-ordinated will give the desired result. Ingenious, capable, and aggressive management with keen foresight will recognize causes leading to problems and will take such action as necessary to insure a favorable solution.

Here are the techniques employed by leading management executives to improve operations, thereby increasing labor productivity, obtaining low cost production and improving the profit position of a company.

The starting point in a company, where there is a desire to modernize techniques, is a *business analysis to develop a plan of action.*

## Personnel

The most valuable asset in any business is its personnel because it is upon the combined skill of the working force and the efforts expended by it that the success of a business depends.

Work is performed by all personnel in a business, from the president down to the porter, for the same basic reason; namely, to receive a return for the effort expended. Mental effort and skill, naturally, bring a higher return than muscular or unskilled efforts. Therefore, the problems of personnel or human relations tie in closely with the problems of wage administration. Inequalities of wages is the cause of the most frequent grievances among employees—executives and white collar workers, as well as plant employees.

## Job Evaluation

The management technique that can be applied to obtain equity and uniformity as to wage rates is called job evaluation. This technique eliminates horsetrading in a union negotiation meeting and puts the problem of a fair day's pay on a sound, scientific factual basis.

When employee representatives meet with management and declare that a minor operation is comparable to a semiskilled or even a skilled operation and they demand a commensurate base rate, and management has to sit there and argue—with words only, nothing factual—and eventually through the needs of expediency agree (or give in) the installation of a job evaluation program in the mill or factory is past due.

A proper job evaluation program will have the approval of employees' representatives for the one simple, undeniable reason, that the same "yardstick" is used plant-wide on all operations—meaning that all comparable operations have been assigned equal point values. This places management in possession of the proper tools with which to cope with any employee-management situation.

Job evaluation is as fair to the employees as it is to management. It eliminates inequalities in the factory. Every job is fairly rated or evaluated on its own merits or requirements regardless of the employee presently performing it. This particular employee may be capable of advancement to a better position. To keep him on a lower rate job is not only unfair to him but a loss to the company—particularly so if he receives high skill pay for a low skilled job requirement.

## Merit Rating

The second important and fundamental requirement in a sound program of perscnnel and wage administration is a thorough analysis and appraisal of an individual's capabilities as he performs the job evaluated. The tool used to accomplish this task is commonly known as merit rating. It is the administrative tool that prevents a deterioration of job values due to changing conditions. It is the basis for promotion from within, transfers, employee training, improvement, and control.

Merit rating measures the quality of company personnel; and upon its findings, able, loyal and thinking employees are developed, retained, and made more effective.

## Production Standards and Incentives

Time is the most important cost factor in any business. It is the basis of all wage payments. Time is money. Time must be controlled; otherwise, costs will be excessive. A production standard is the time allowance to perform a given task. Scientifically established production standards are based on a fair day's work.

The technique of obtaining a fair day's work is to pay an incentive for all work over standard requirements. Establishing a production standard should never be done by time studying what a man is now doing. The method should be to develop the one-best-way to do the job by using engineering principles of work simplification. With the steps for doing a job determined, the time required to do it can be established. In fact, the engineer should be able to set the time without a stopwatch.

Many paper mills use the piece work system for incentive pay calculations. In doing so, any burden caused by improper management is put on the employee unless make-up pay is provided. Therefore, unless a sufficient contingency budget to cover make-up pay has been included, it is a real upsetter to predetermined costs.

Frequently make-up pay is given erroneously to cover "short" piece work rates which have been established as a result of inefficient time study, faulty planning, improper work flows, and poor supervision. "Short" piece work rates will occur through inefficient time study, methods, work flows, etc. Whatever their origin, they result in nonaccurate estimates and costs. They constitute an unnecessary burden on efforts to meet competitive price. They eat up profits.

There are times (particularly in factories producing a wide range of paper products) when work flows become "spotty" and make-up pay is in order. It is inexcusable, however, if the need for make-up pay is caused by a lack of proper and efficient planning.

Make-up pay to beginners should be in the form of a clean cut, predetermined "apprentice allowance." This allowance should be set from actual experience and should cover the various operations. "Par" should be strictly en-

forced. At the end of an established period, if 100 per cent production has not been attained, the beginner should be transferred to another operation or released entirely.

In a mill where job evaluation, merit rating, production standards, and incentives are missing, or not engineered properly, advantage is not being taken of a possible 20 per cent to 30 per cent saving in direct costs. Furthermore, the strain on executives and supervisors handling labor troubles is a needless waste of effort.

### Evaluated Rate Standards

Many paper mill executives believe that if they have a time study department, they are doing everything possible for labor. Still they have labor headaches, high wage grievance and what is called "creeping piece rates."

The tool developed to meet a situation of this kind is known as evaluated rate standards. The use of the tool will stop the time study engineers' customary procedure of neglecting previous studies and studying each job as something new and different. It removes the human element which permits errors; it also develops all piece rates on the same factual basis.

Based on previously prepared time studies, standard data and performance records, standard values can be set scientifically for all motions that comprise an operation. Time study engineers using these values developed in tabular form are required to make their studies according to the principles of motion economy. They must evaluate their own studies with the table.

*Illustration*: A study of standard data in a box department of a paper mill revealed that the time allowance for one man to walk five feet to get a rack of boxes was a shorter period than that for another man to walk three feet to get the same rack. Obviously, something was wrong. The basis for a wage grievance existed; the company was unfair to one of these two men.

The big advantage of evaluated rate standards is that it will eliminate or minimize the inequities that exist in wage incentive pay just as job evaluation will eliminate or minimize the inequities in hourly pay. Agreement is accomplished by getting acceptance on the tables developed. Since all standards are related to the table, unfairness cannot exist and a rate cannot creep.

### Production Planning

Production planning is the work of managers, from the foremen to the president, to determine the output of direct workers. Generally, managers are assisted on details by white collar workers or staff members. In many mills, managers can lower costs by eliminating labor waiting time, idle machine time and bottlenecks. The technique to use is a modern production control system which includes the time factor and visual aids to indicate off-schedule performance at a glance and when it occurs. The time factor permits scheduled production at scheduled cost and improved customer relations by deliveries on time. Time is money in production; and by cutting the process cycle, a 15-25 per cent saving in indirect costs can be anticipated by the installation of technically correct production and cost controls.

### Plant Layout

It costs money to move one pound one foot. It is a waste of money if the move is unnecessary. The first step to eliminate this waste is a process layout. Such a layout may show that only slight revisions and rearrangements will produce large cost reductions. One paper mill which consumed 500 tons of raw material per day in its corrugated box plant made a process layout and from a study of it obtained the following improvements:

(1) Better routing of work in process; (2) reduction of rehandling; (3) reduction of handling expense; (4) increased storage capacity; (5) increased production capacity.

The total cost reduction amounted to $40,000 a year at a cost to make the changes of $21,600.

### Overhead Control

The paper industry is undergoing fundamental changes which require larger capital investments and increased expenditure in supervision, technical salaries, maintenance, power, clerical expense, indirect materials and the like. Overhead expense is the predominant element in costs and pricing. Its importance is increasing with the use of new equipment, faster processing, vacations with pay, and many other factors. Overhead must be controlled and definitely related to specific amounts of measured production.

*John D. Corrigan*

The most effective technique to control overhead costs is to place individual responsibility of these costs at the points where they originate and to set up a control to maintain them at a minimum. This technique of decentralized authority and responsibility, and centralized controls will increase the effectiveness of executives, supervisors and foremen by organizing, stimulating, and controlling their activities as they exercise the authority of responsibility. Furthermore, as it increases the effectiveness of management, it also gives a 15-25 per cent reduction in overhead costs. The simplest method to use is a flexible control budget.

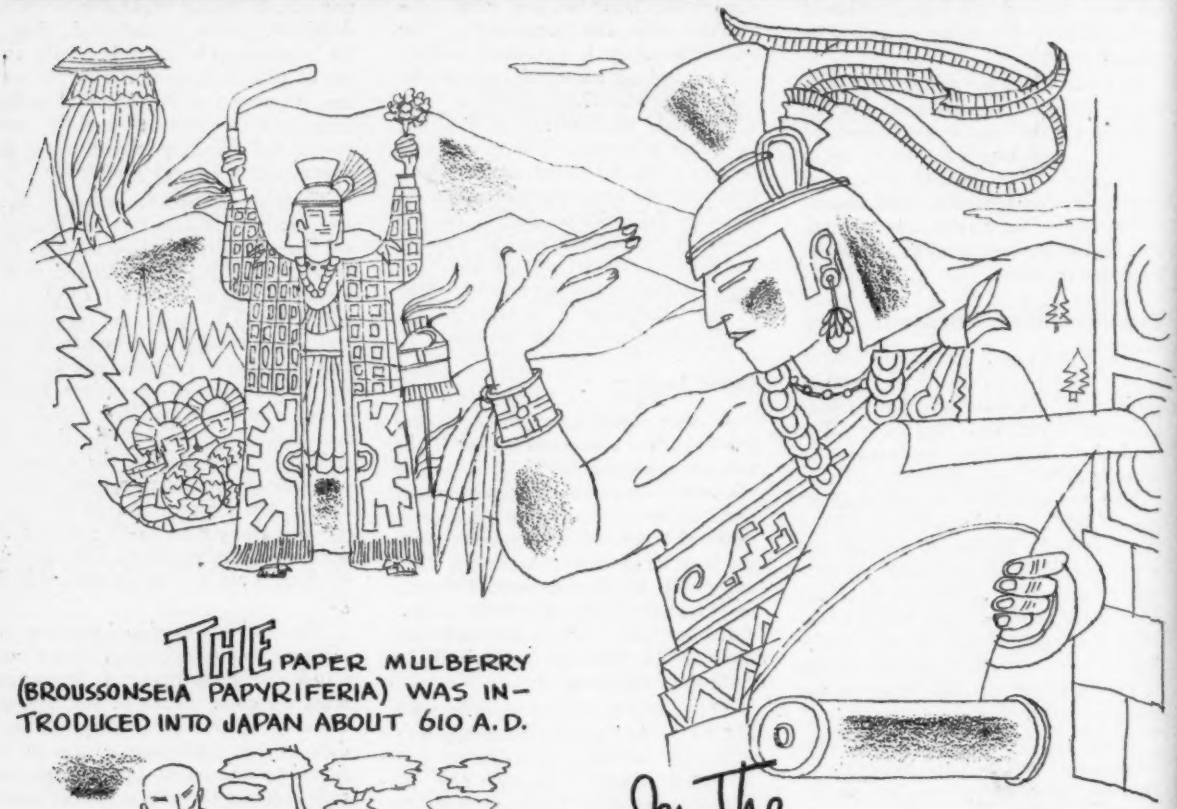
The flexible control budget is a management tool which establishes a cost standard of performance. It determines what all costs should be for any income or volume of activity. Thus, a definite cost performance can be assigned to a manager. For example, his task becomes the production of a certain number of boxes at a certain cost.

Since every operation has its corresponding expense, it reflects itself in costs. A comparison of actual costs with budgeted costs will indicate the weak spots in performance. This information permits a top executive to strengthen his staff, improve operations and lower costs.

Increasing the productivity of executives, department heads and foremen requires constant stimulation. This stimulation is best accomplished with a supervisory incentive based on improving the cost factors over which these men have control. The flexible control budget sets the overhead cost standard in relation to production. The incentive is based on a share of the savings by operating at less than standard.

Modern management techniques are essential in every organization in the paper industry. Such methods and procedures as have been outlined are the major requirements. Other techniques need to be developed to meet the particular individual requirements of a company. Application of these techniques can be measured in low-cost production and higher profits. Improving operations, thereby increasing labor productivity, is a profit making activity.

# Paper SKETCHES . . . . . .



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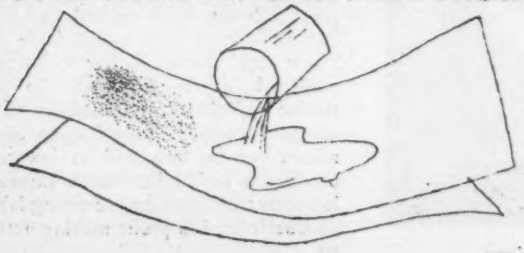
In The EARLY 1500'S, THE AZTEC GOVERNMENT AT TENOCHTITLAN RECEIVED 480,000 SHEETS OF AMATL PAPER ANNUALLY AS TRIBUTE FROM VASSALS

Waterproof PAPER, UTILIZING GLASS YARN FOR REINFORCING — THE YARN LYING EITHER IN PARALLEL OR IN DIAMOND PATTERN BETWEEN TWO SHEETS OF ASPHALT-BONDED KRAFT PAPER — IS NOW BEING MANUFACTURED BY SEVERAL PAPERMAKING FIRMS.



WORKING TOGETHER FROM SUNRISE TO SUNSET, A VATMAN, COUCHER, AND LAYMAN, DURING THE DAYS OF COLONIAL AMERICA, WOULD PRODUCE ABOUT FIVE REAMS OF PAPER A DAY

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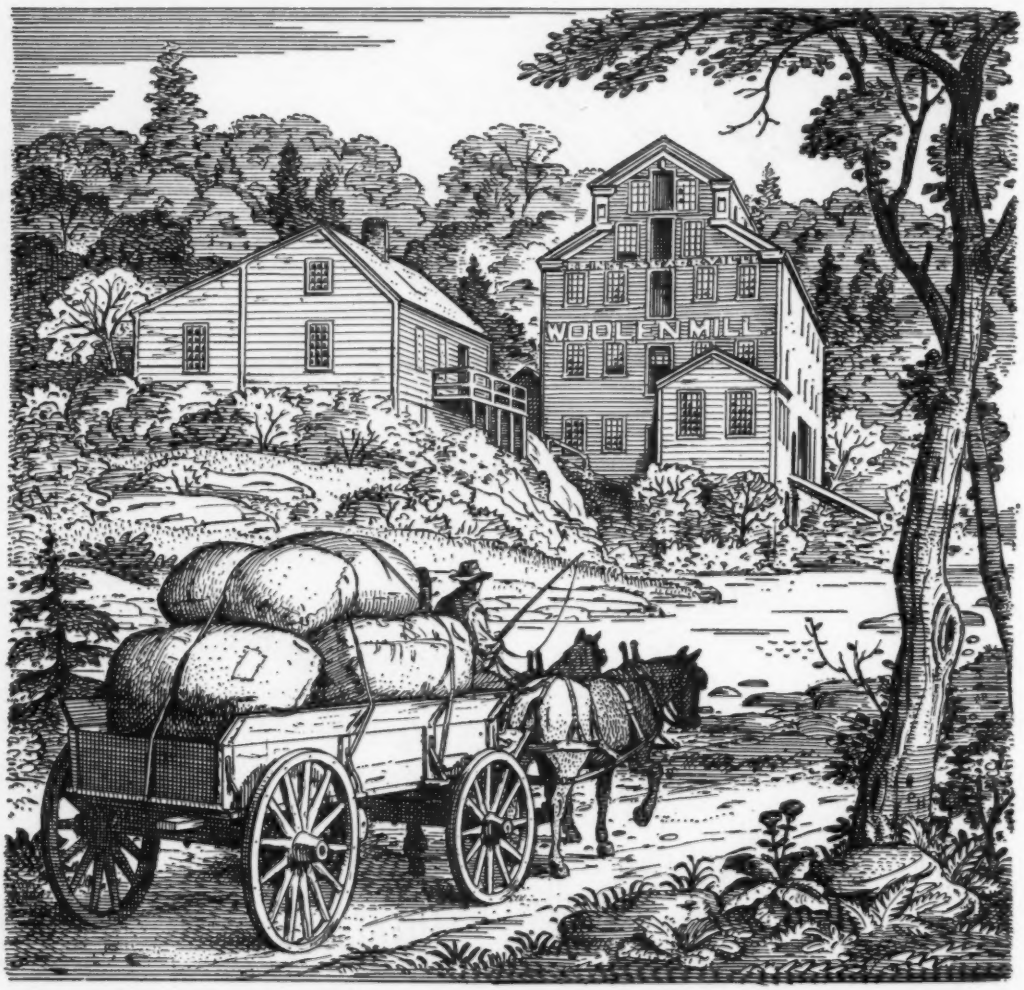


# A New Industry Comes to America

In the late 1860's, with newer, better, faster machines, and with plentiful wood pulp in prospect to feed them, the paper industry boomed. Still the essential papermakers' felts were largely imported from England. Pioneers set about to supply the urgent need—American-made felts for America's multiplying paper mills.

Among the first of the American felt-weaving mills was one now known as F. C. Huyck & Sons. Established in 1870 in the village of Rensselaerville, New York, it has grown to be the largest manufacturer of papermakers' felts in the world. It has cooperated closely with the papermakers, designing and producing felts to run at greater speeds, remove water in greater volume, provide new finishes for new types of paper. This is its continuing purpose: to meet the most exacting needs of the vital paper industry.

*The dramatic story of paper is told in the sound-and-color film, "Paper— Pacemaker of Progress," and in a book under the same title. Both are presented by F. C. Huyck & Sons as a tribute to the Paper Industry. The book will be sent free upon request.*

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KENWOOD WOOL PRODUCTS

**HUYCK *Felts***

# TAPPI'S Second Engineering Conference

▶▶▶ THE SECOND Engineering Conference sponsored by the Engineering Division of the Technical Association of the Pulp and Paper Industry was held at the Bellevue-Stratford Hotel in Philadelphia, on November 3-5, 1947.

J. W. Hemphill, Johns-Manville Corporation, was general chairman of the conference. In the preparation of the program he was assisted by J. E. A. Warner, Robert Gair Company, G. H. Pringle, Mead Corporation, Milton Jacobs, Charles T. Main, Inc., G. R. Wadleigh, Consultant, and A. E. Montgomery, J. O. Ross Engineering Corporation.

The conference was outstandingly successful. Approximately 500 members of TAPPI and guests were present for the several sessions.

### Puseyjones Day Enjoyable and Profitable

The highlight event of the meeting was the boat trip on the *Delaware Belle* from the pier at the foot of Chestnut St., Philadelphia, down the Delaware River to the pier at the plant of The Pusey and Jones Corporation at Wilmington, Delaware, followed by a trip through the Puseyjones plant, dinner and entertainment at the Wilmington Shrine Club, and return trip to Philadelphia by special bus. The ship pulled anchor at Philadelphia about 12:30 P.M., and arrived at Wilmington about 3:00 P.M.

Inclement weather of the morning—a very heavy fall rain—did not mar the voyage. The rain stopped shortly before the boat sailed and, although the sky was overcast and leaden and the wind somewhat raw, the trip proved a pleasant interlude in an otherwise busy day.

With The Pusey and Jones Corporation acting as host, and the entire day designated as Puseyjones Day, luncheon was served on board ship enroute to Wilmington. There also was entertainment.

Many of the newer uses for paper and paperboard products were exhibited in three displays on the ship. Likewise, there was a gallery of photographic enlargements showing Puseyjones paper machine improvements and views of complete papermaking machines.

In the trip through the plant of Puseyjones, guides explained such developments as the "Rapi-Drape" wire changer, Flow Spreader, "Simplex" press part, Stream Flow vat system, Stream Flow cylinder mold, and the Improved steam joint.

Among the departments in the plant which were visited were the foundry, sheet metal shop, metals fabrication division, machine shop, erection shop, and the hydraulic laboratory in which scale size working models of stock flow equipment permit controlled reproduction of a wide variety of operating conditions.

A great deal of interest was shown in the dynetric balancing machine—recently installed—in which all rotating parts in Puseyjones machines, from a small gear to the largest roll or drying cylinder, are balanced well beyond the range of operating speeds required for each individual part.

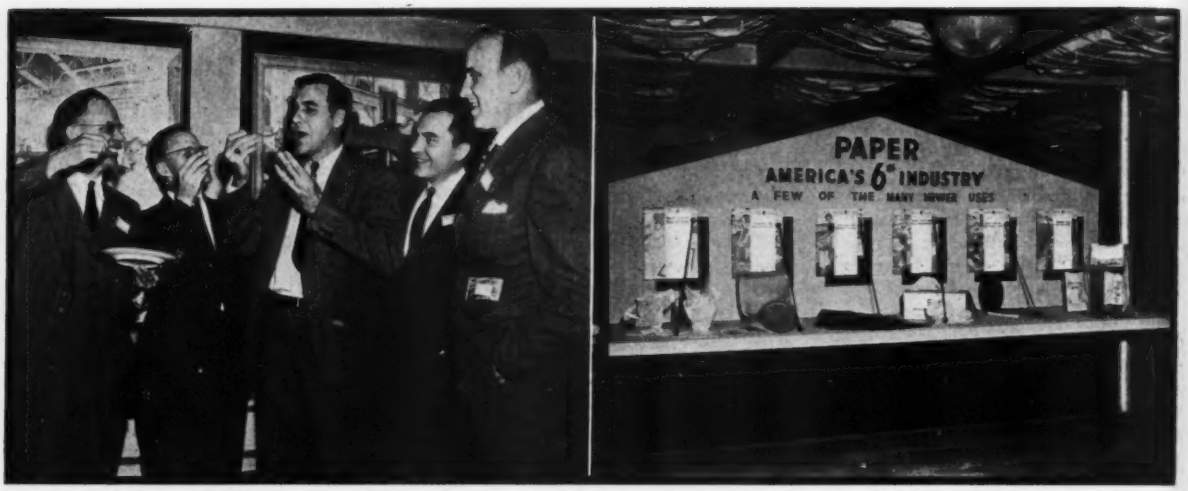
A pictorial presentation of the vast amount of engineering data, drawings and quantities of materials which go into the building of a modern liner machine also was exhibited to the visitors.

### President Gillespie Opens Conference

The conference was opened on the morning of November 3, shortly after 10:00 o'clock, by W. F. Gillespie, Gaylord Container Corporation, Bogalusa, La., and president of the Technical Association of the Pulp and Paper Industry. In his remarks, he referred favorably to the four earlier TAPPI meetings this fall (Appleton, Syracuse, Asheville, and Alton); stated that the Philadelphia meeting was the fifth and final meeting of this year's fall meetings; and stated that another engineering meeting is to be held next year. Mr. Gillespie related that the engineers must assume responsibility for these meetings—that their desires must be made known to the executive committee of TAPPI in order that the engineering group may prosper.

Immediately after the opening re-

*LEFT—Braving the wind on the aft deck of the "Delaware Belle" on her cruise down the Delaware River from Philadelphia to Puseyjones plant at Wilmington are: (L to R) G. H. Suhs, Sorg Paper Co., Middletown, Ohio; K. Matchuk, Howard Paper Mills, Inc., Urbana, Ohio; P. J. Jerardi, Black-Clawson Co., Hamilton, Ohio; R. C. Berger, General Electric Co. . . . RIGHT—I. J. Stafford, general superintendent, Neenah Paper Co., Neenah, Wis., holds the attention of three other delegates. Shown left to right are: Mr. Stafford; M. A. Golden, Falls Paper & Power Co., Oconto Falls, Wis.; R. W. Bauman, Appleton, Wis.; Donald L. Calkins, Wausau Paper Mills Co., Brokaw, Wis.*




*LEFT—The "raw" oyster bar on shipboard was a popular spot during the trip down the Delaware on Puseyjones Day at the TAPPI Engineering Conference. Left to right: W. Patterson, of Industrial Engineering; H. W. Stevens, S. D. Warren Co., Boston; F. W. Roberts, S. D. Warren Co., Cumberland Mills, Me.; J. H. Freiday; and V. P. Owens, Combustion Engineering Co., N. Y. . . . RIGHT—When TAPPI engineers sailed from Philadelphia to Wilmington, three displays on new uses for paper and paperboard products attracted considerable attention. The displays, arranged by The Pusey and Jones Corp., included samples of paper products such as wash cloths, bags for vacuum cleaners, bags for garbage disposal, windshield tissue, tape for recording sound, window bags for perishables. These new uses for paper are featured in Puseyjones advertising in paper trade publications*

marks by Mr. Gillespie, Mr. Hemphill, as general chairman, welcomed everyone present at the conference. He said that the formation of the TAPPI Engineering Division had been particularly timely. The Third Engineering Meeting, he related, will be held in October (1948) at Buffalo, New York.

## Papers of Mill Design Session

During the three-day meeting, there were five formal engineering sessions —one each morning and one each afternoon except the afternoon of the second day which was given over to the boat trip and plant visitation to Puseyjones. The first of these sessions, which followed immediately after the opening remarks of Mr. Gillespie and Mr. Hemphill, was on Mill Design. The chairman of this session was Milton Jacobs.

The papers presented before the Mill Design session were: Treatment of Surface Water Supplies for Pulp and Paper Mills, by R. R. Adams, J. E. Sirrine and Company, Greenville, S. C.; Centralized Planning and Control of Plant Layouts, by C. E. Cass, Marathon Corporation, Menasha, Wis.; and Reminiscences of the Pulpwood Campaign—A Case Study in Materials Handling, by C. E. Patch, Morton C. Tuttle Company, Boston, Mass.

Mr. Adams, in his paper, discussed the treatment of surface waters in the Southeast. Because of the varying quality of the water in various localities of the region, he said, it is necessary to vary the type of treatment to provide waters of suitable quality for pulp and paper mill operations.

Mr. Adams also brought out that plain sedimentation is used where the waters are very turbid with a sterilization stage to control bacteria and algae; that alum is generally used as a coagulant with the added addition of an alkali where turbidities are above normal; that either stationary baffles or mechanical devices are used with flocculation equipment; and that various types of sedimentation basins and equipment are used before the filtration stage. The rate of filtration, he added, may be limited to 2 gpm per square foot if the water is to be used for drinking purposes but rates of 2.5 to 3.0 gpm per square foot are not unusual. In concluding his remarks, Mr. Adams stated that *p*H adjustment before storage completes the system.

In the paper by Mr. Cass, it was brought out that the operating efficiency of a plant today is no better than its plant layout. Mr. Cass mentioned that the functions of a plant layout department include the analysis and design of layouts for the manufacturing department. The use of a flow diagram in this work, he said, makes it possible to determine where operations can be eliminated, combined, or simplified or if the sequence of operations can be changed. In continuing his remarks, Mr. Cass stated that master layouts can be made by using a flat plane with templates which are held in place by superimposing a transparent sheet; that flow lines, conveyors, etc., can be indicated on the sheet, and the whole assembly photostated for permanent record.

In the opinion of Mr. Cass, a well organized plant layout program will reduce manufacturing cost by providing straight line flow, reducing the amount of work in process, conserving floor space, and improving handling methods.

Mr. Patch, the concluding speaker of the Mill Design Session, was introduced by George Wadleigh, Consultant. His remarks for the most part covered personal observations based on numerous wood yard situations. Numerous points covered by his comments were brought out with the help of lantern slides. These slides consisted of both photographs of installations and sketches.

## Session on Paper Drying and Ventilation

The afternoon of the first day of the meeting was given over to the Drying and Ventilating Session with A. E. Montgomery as chairman.

C. H. Young, Midwest Fulton Machine Co., Dayton, Ohio, presented the first paper before this session. His subject was: Steam Supply and Control Arrangements for Dryers. Mr. Young, using a splendid selection of lantern slides to illustrate his talk, described a number of steam supply and control arrangements for dryers. He stressed the use of thermocompressors to reduce high pressure steam to pressure desired in the dryers for drying.

Heating Water with Waste Heat was the subject of the second paper of the Drying and Ventilating Session.

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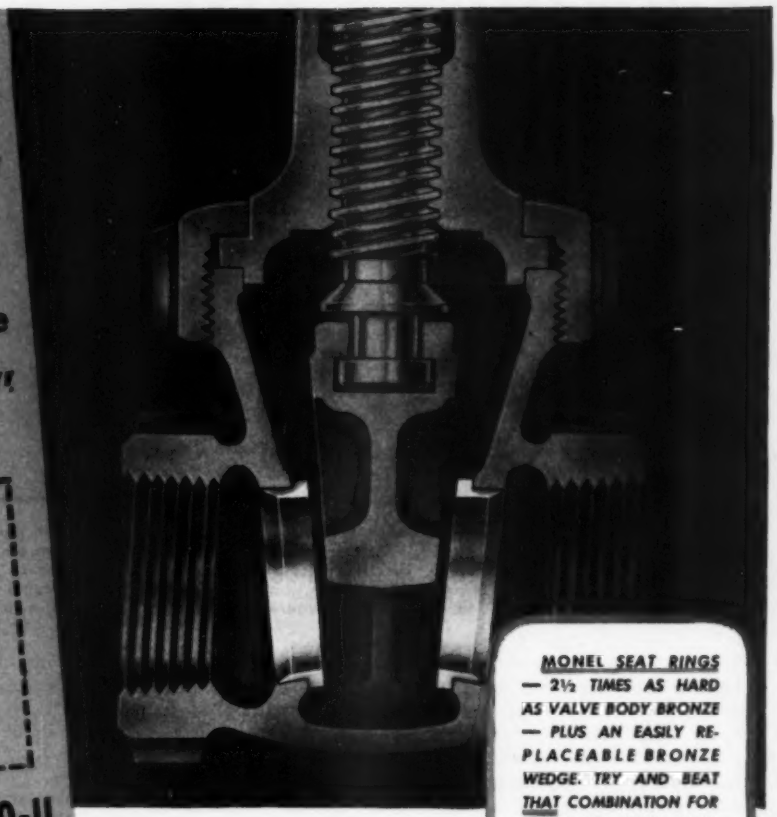
in the NEW FIG. 270-U 200 lb. BRONZE GATE



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Wear affects only the most accessible part — the bronze wedge — which can be replaced simply by slipping it off the stem and slipping on a new one. The seat rings, expanded in the body, are super-tough MONEL, for lifetime durability. Convincing tests, in toughest service, prove it the best seating combination to beat wear, reduce care.

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*LEFT—Enroute to the Puseyjones plant in Wilmington, Mr. and Mrs. R. A. Harvie of Canadian Westinghouse Co., Ltd., Hamilton, Ont., and Mr. and Mrs. C. P. Robinson of Heppenstall Co., N. Y., look over their guide book. . . . RIGHT—Among the guests on the Puseyjones trip were a number of wives of TAPPI members. Shown left to right, with their husbands' companies given in parentheses, are: Mrs. K. J. Mackenzie (Supt. of paper mills, Kodak Park Works, Eastman Kodak Co., Rochester, N. Y.), Mrs. A. J. Dotz (American Box Board Co., Grand Rapids, Mich.), Mrs. S. Johnston (Rhinelander Paper Co., Rhinelander, Wis.)*

Presented by L. G. Janett, J. O. Ross Engineering Corp., this paper covered methods which have been used to recover heat from paper machine exhaust and the uses to which this heat has been put. Any water usage requiring direct heating with steam, stated Mr. Janett, is a potential application for hot water from a recovery system.

The Drying and Ventilating Session was concluded with a report on Field Investigations on Drying by the TAPPI Drying and Ventilating Committee by A. E. Montgomery, as chairman of the Committee. In part, Mr. Montgomery stated that the investigation was made possible by a TAPPI fund; that forty tests were made to ascertain variation in drying rates from the wet end to the dry end of paper machines; and that in these forty tests are the results obtained in checking machines operating on glassine, writing, tissue, board, book, kraft and kraft board.

Mr. Montgomery added that the moisture in the sheet entering the dryers, as revealed by the investigation, was less than he had thought. Averages of moisture content of sheets entering the dryers for four of the grades studied were: tissue, 30.9 per cent; board, 32.8 per cent; book, 34.2 per cent; and kraft, 29.9 per cent. The percentage of moisture in sheets leaving the dryers for five of the different papers studied averaged as follows: glassine, 4.7; writing, 2.7; tissue, 3.8; board, 3.6, and kraft, 2.9.

In the opinion of Mr. Montgomery, little is known of the function of dryer felts in drying. He also stressed the lack of suitable instruments for measuring the moisture content of a running dryer felt or for measuring the tautness of such felts.

## Mill Maintenance and Materials Session

The morning session of the second day of the meeting was held aboard the *Delaware Belle* as it lay anchored at its dock rather than at the Bellevue-Stratford Hotel. It was a session devoted to Mill Maintenance and Materials; and George H. Pringle, Mead Corporation, was its chairman.

The program of this session listed five papers. The first of these papers to be presented was read by George W. Charters, Crown Zellerbach Corporation, Camas, Wash. Mr. Charters' subject was Preventive Maintenance.

In brief, Mr. Charters stated that maintenance must be given the same status and rank as production if it is to achieve the objective for which it is created; that preventive maintenance puts the emphasis on "fixing" before natural wear and tear result in loss of scheduled production time; and that, on a normal basis, all maintenance work, both mechanical and electrical, should head up under one person, the plant engineer, or, if the plant or engineering work is large enough, to an assistant plant engineer; that under the man heading up all maintenance, there should be a mechanical superintendent, a chief electrical engineer, and a chief power plant engineer.

Mr. Charters also related that maintenance personnel should be permanently assigned to specific departments where necessary but that these men should continue to be part of the maintenance organization; that there is a need for planned systematic training of maintenance personnel, both salaried and hourly; and that the effectiveness of maintenance can be increased and the cost decreased; by a proper maintenance organization, granting of proper status to maintenance, and by the establishment of standard practices, inspection and training of maintenance personnel.

Lee C. Dryden, Marathon Corporation, Menasha, Wis., presented the second paper to be given before the Mill Maintenance and Materials Session. His subject was Systematic Operation of Maintenance and Construction Departments.

Mr. Dryden stressed a construction and maintenance organization in which all work was allocated by means of a dispatcher. Through the use of lantern slides, he showed numerous forms used for the handling of work orders and for recording historical data concerning equipment and buildings.

Dryer Bearing Circulation Systems was the next paper to be given before the session on Mill Maintenance and Materials. Presented by A. I. Sippola, Socony-Vacuum Oil Co., New York, N. Y., this paper touched upon the use of ring-chain, and collar-oiled bearings for dryers. To minimize oxidation in such bearings, oil was removed from the heat zone by continuous feed and overflow return. Providing still more oil to each bearing permitted the elimination of ring, chain or collar, and, in turn, overflow, allowing all of the oil to drain from the bottom of the bearing housing. This method of lubrication, designated as dry-sump, has been extended to anti-friction bearings as well.

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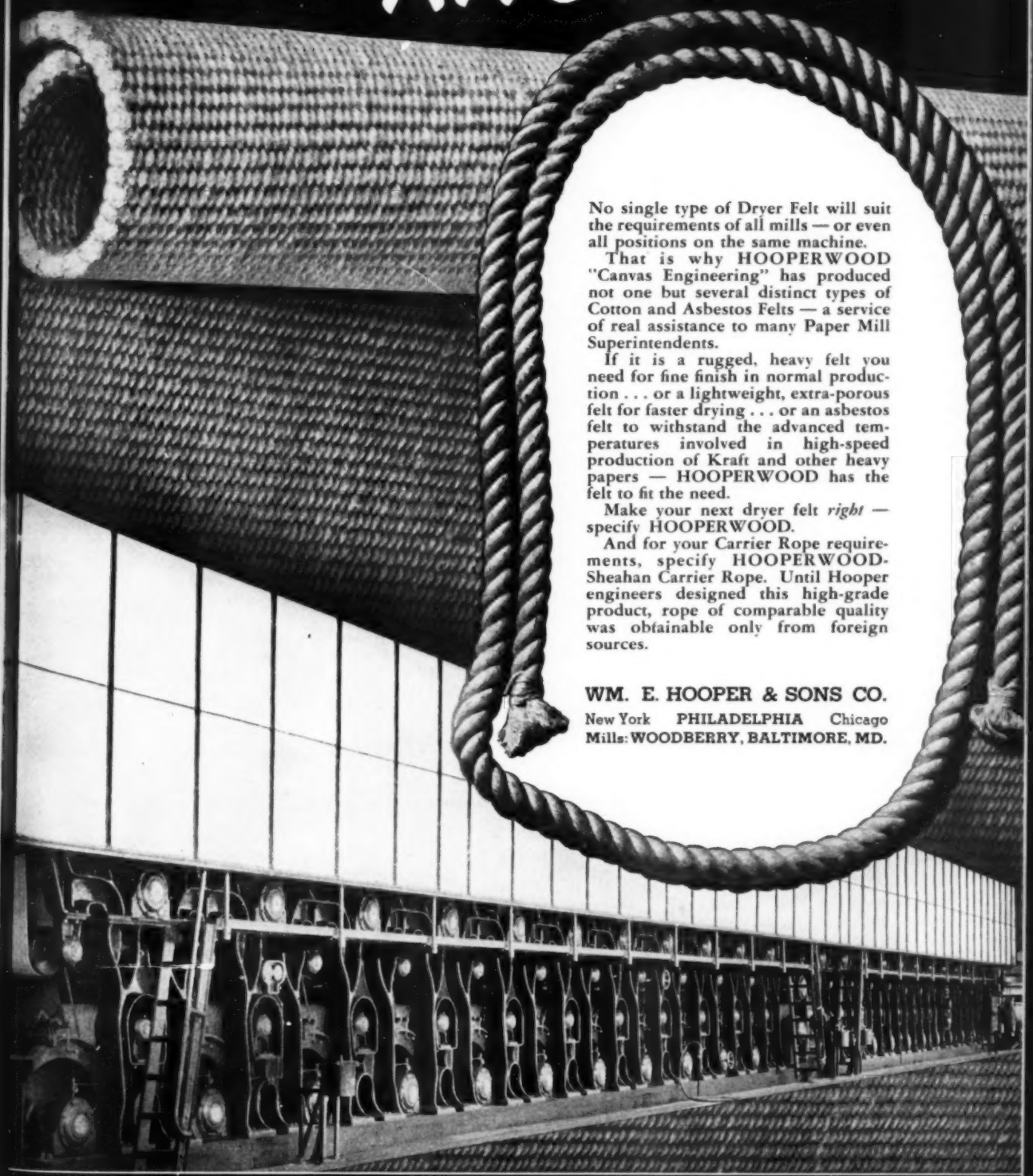
# WHAT EVERY PAPER MAKER *KNOWS...*



No single type of Dryer Felt will suit the requirements of all mills — or even all positions on the same machine.

That is why HOOPERWOOD "Canvas Engineering" has produced not one but several distinct types of Cotton and Asbestos Felts — a service of real assistance to many Paper Mill Superintendents.

If it is a rugged, heavy felt you need for fine finish in normal production . . . or a lightweight, extra-porous felt for faster drying . . . or an asbestos felt to withstand the advanced temperatures involved in high-speed production of Kraft and other heavy papers — HOOPERWOOD has the felt to fit the need.

Make your next dryer felt *right* — specify HOOPERWOOD.

And for your Carrier Rope requirements, specify HOOPERWOOD-Sheahan Carrier Rope. Until Hooper engineers designed this high-grade product, rope of comparable quality was obtainable only from foreign sources.

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## HOOPERWOOD DRYER FELTS

### COTTON AND ASBESTOS

The newer machines, with improved bearing seals, said Mr. Sippola, have made it possible to increase the rate of oil flow, and thus provide lower temperature of the oil as it leaves the bearing, and improved mechanical washing. The capacity of a system, he said, should be sufficient to allow complete recirculation in 1 to 2 hours.

Adequate flow has been made possible by increasing the size of oil feed and return lines. Water or moisture contamination is combatted by proper venting, by use of exhaust blowers, or by introducing enough cool air to maintain 1 to 2 inches of mercury pressure within the system. Despite improved machine design and improved oils, commented Mr. Sippola, it is necessary to inspect machine elements, as well as to analyze the oil, in order to determine the true condition of the system.

The remaining two papers scheduled on the program of the Mill Maintenance and Materials Session were: Installing and Maintaining Flow Meters in Pulp and Paper Mills, by C. H. Barnard, Bailey Meter Co., Cleveland, Ohio; and the Suction Roll of Today, by H. C. Merritt, Downingtown Mfg. Company, Downingtown, Pa.

In the paper by Mr. Barnard, it was brought out that the best installation of flow meters comes from good workmanship; that care should be taken to comply with manufacturer's recommendations when making the installation; and that sustained accuracy of a meter depends on proper and adequate maintenance. Mr. Barnard also stated that heavy black liquor flow can now be measured successfully with a bellows-operated electronic telemeter or with the newer Area telemeter. Both of these instruments, he related, provide many advantages over other types of meters for this service, and will give accurate reading with long, trouble-free life.

Mr. Merritt, in his paper on The Suction Roll of Today, related that patents dating back from 15 to 60 years include the basic elements of modern design; that the suction couch roll, first application of the suction roll, is today almost universally used on all except certain specialty machines; that the advantage of suction rolls in their various forms is a dryer sheet which permits higher speeds and safer pressing.

## Papers of Steam and Power Session

J. E. A. Warner, Robert Gair Co., was chairman of the Steam and Power Session which was held on the morning of November 5, the third and last day of the meeting.

The program of this session included four papers, the first of which was a joint paper by E. L. Cowan and W. V. Knight, Gaylord Container Corporation, Bogalusa, La., on Short Circuit Analysis of a 40,000 kv.-a., 2,300 v. Power System on an a-c Network Calculator—a Case Study.

Presented by Mr. Cowan, this paper revealed that an electric system, regardless of the thoroughness of design, construction, and maintenance, occasionally will be subjected to faults or short circuits. The factors contributing to the magnitude of short circuits were touched upon. The paper also described an a-c network calculator-power system in which actual or contemplated electrical networks can be set up in small scale to permit the study and analysis of operating or design problems.

The subject of the second paper to be given before the Steam and Power Session was: A Fuel Engineering Study of Some Recent Boiler Installations in the Pulp and Paper Industry. The paper was presented by J. E. Tobey, Fairmont Coal Bureau, New York, N. Y.

Mr. Tobey stated that the pulp and paper industry ranks second of 20 major industries in the purchase of steam-generating equipment (based on number of units) since the end of World War II; that the pulp and paper industry, like the electric utilities industry and others, is progressive in purchasing boiler units of conservative design; and that, in a study of 65 postwar installations located in 12 northeastern and Great Lakes states and Canada, steam pressures ranged from 150 to 925 psi, the average being 468 psi, steam temperatures, from 365 to 825 Fahr., average 629 Fahr.; and that design boiler and furnace efficiencies ranged from 76.4 to 87.5 per cent, averaging 84.0 per cent.

Mr. Tobey pointed out that bituminous coal will continue, as in the past, to be the basis fuel for the pulp and paper industry and suggested that large mills should, by one of several means, attach themselves to large coal reserves through substantial producers.

Next on the program of the Steam and Power Session was a paper on Modern Bark Burning, by M. H. Snodgrass, Detroit Stoker Company, Detroit, Mich. This paper described the installation of a spreader type stoker to a standard B & W Stirling four-drum boiler in which the baffles had been redesigned to secure maximum flame travel before combustion gases enter the boiler. The stoker was equipped with a traveling continuous discharge type of grate which discharges the ash in a hopper beneath the operating floor line.

The bark is screened and that which passes through 2-in. openings goes to a bark bin from which it is distributed on the stoker. Coarse bark goes directly to the furnace by a gravity feed. The main supply of bark and coal fuel are fed from the same bin and fuel spouts but not usually simultaneously. It is possible to change from bark to coal without losing load or steam pressure.

The unit, started in April, 1946, has operated satisfactorily on either bark or coal at more than the design capacity of 85,400 lb. per hour on bark and 100,000 lb. per hour on coal.

W. S. Patterson, Combustion Engineering Company, New York, N. Y., presented the fourth and last of the regular scheduled papers on the program of the Steam and Power Session. This paper, on the subject of Factors involved in Selection of Stationary Steam Generating Units, classified steam generating units as small or large, the dividing line being assumed as 100,000 lb. per hour steaming capacity. In the small unit classification are horizontal return tubular (fire tube); three drum low head bent tube; box header, straight tube; two drum vertical bent tube; and sectional header straight tube.

Thirteen factors were listed by Mr. Patterson as being basic in the selection of a large steam generating unit. These factors are: customer's preference, building limitations, evaluations, maximum capacity, capacity range, steam temperature, steam temperature control range, pressure, fuel temperature, fuel and analysis, auxiliary or future fuel, nature of feedwater, and desired efficiency.

## Session on Engineering Research and Design

The concluding session of the meeting was on Engineering Research and Design. Held during the afternoon of November 5, the third day of the meeting, with P. H. Goldsmith, Pusey and Jones Corporation, as chairman, the session scheduled the presentation of four papers.

The first of these papers was given by J. B. Gough, Mead Corporation, Chillicothe, Ohio. The subject of the paper was: Supercalender Roll Deflections and Crowns.

Mr. Gough stated that the duty of a supercalender generally is to improve the finish on the paper it receives from the "all metal roll" calender on the paper machine at as fast an operating speed as possible and with a minimum of breaks, splices, lost time, and waste paper. Emphasis was placed

# R-S valvEvents

ISSUED PERIODICALLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH FLOW CONTROL AND SHUT-OFF

## D. W. (Dave) HOPKINS
### Executive Vice President

Announcement is made of the appointment of David W. Hopkins, widely known consulting engineer, as Executive Vice President of R-S Products Corporation. Hopkins has previously been Vice President and since 1939 in charge of the Valve Division of R-S Products.

Earlier in his career he served as consulting engineer and Vice President of V. E. Montgomery Company, Cincinnati, Ohio, where he specialized in processing and mechanical engineering.

After his graduation from Hughes High School, Cincinnati, in 1912 and the University of Pennsylvania in 1916 (mechanical engineering), he did post-graduate work in aeronautical engineering at the Massachusetts Institute of Technology.

*(photo by Fabian Bachrach)*

Noteworthy also in his background is extensive research at the University of Pennsylvania, with Professor W. S. Pardoe — resulting in many basic advances in valve construction and performance.

Mr. Hopkins was a Navy Pilot (USNR) in World War I and in his college days a noted left end for three years at U. of P.

## Other Changes at R-S Products

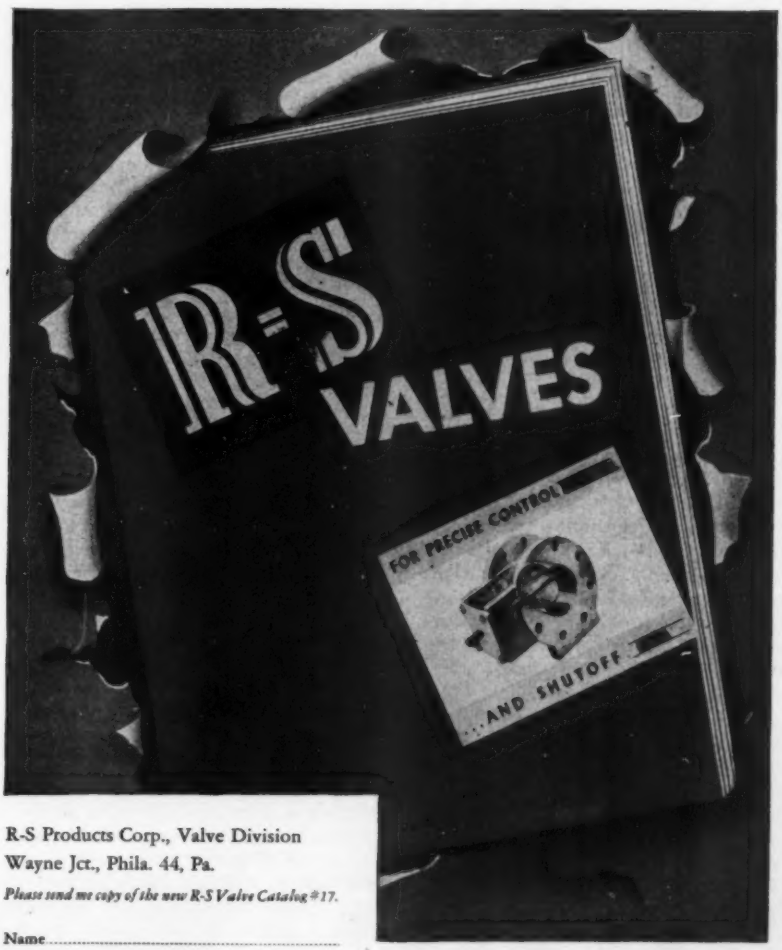
Russell C. Ayers has been named Sales Manager of the Valve Division. George B. Crawford has been named Chief Engineer of the Valve Division.

Both men have been with R-S for several years and have done a handsome job both for customers and distributors, for which the new titles and enlarged responsibilities are a just reward.

Excelsior!

JMLeeP-L2

## Send for YOUR copy of the NEW R-S Valve Catalog No. 17!




R-S Products Corp., Valve Division
Wayne Jct., Phila. 44, Pa.

*Please send me copy of the new R-S Valve Catalog #17.*

Name .....

Title ..... Company .....

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**Fully descriptive, generously illustrated; includes *complete* dimensional data on *all* R-S Valves. Write, wire, or phone:**

**R-S PRODUCTS CORPORATION**
**Wayne Junction, Philadelphia 44, Pa.**

*A reception and dinner at the Adelphia Hotel was held on the evening of the first day of the Second TAPPI Engineering Conference*

on the effect of roll deflections and crowns on various characteristics imparted to the sheet by supercalendering—especially on the uniformity of the surface finish across the entire sheet width, and on calender cuts, snap-offs, and broke.

A. Stewart Murray, SKF Industries, Inc., Philadelphia, presented the second paper before the Engineering Research and Machine Design Session. His subject was: Hydraulic Mounting Technique for Roller Bearings. Designated as the SKF oil injection method, the technique may be used for mounting and dismounting of large roller bearings. The paper industry's widespread use of interference mountings, involving bearings and journals with mating tapers, permits fuilest use of the potentialities of the system. Bearing applications recently mounted and currently being made for paper mills, said Mr. Murray, lend themselves to interesting theoretical analysis and study.

Engineering Studies in Packings was the subject of H. G. Koch, Johns-Manville Research Corporation, the next paper on the program. Mr. Koch brought out that carefully installed packings, intelligently adjusted during subsequent operations, result in greater life, reduced maintenance cost, and increased production. The packing must constitute a continuous barrier to the passage of the fluid being handled. It also must press against the mating equipment surfaces with a unit pressure somewhat higher than the pressure of the fluid being sealed. The following factors tend to reduce the sealing pressure: plastic flow of the packing material into voids within itself or in the equipment, loss of material due to wear or abrasion, thermal expansion effects, and attack or solution of the packing material by the fluids handled. It is important that some leakage through the packing be tolerated if minimum operating temperatures and maximum life are to be obtained.

The concluding paper on the program of the Engineering Research and Machine Design Session and the reading of which brought the three-day meeting to a close was presented by Fred W. Atz, Jr., Link-Belt Company, on The Electrofluid Drive. The drive combines a general purpose motor with a fluid coupling—the coupling consisting of two main elements (impeller and runner) and the power being transmitted entirely by the mass and velocity of the moving oil between the two elements. Among the advantages cited by Mr. Atz for the drive are the following: eliminates shocks, impacts and torsional vibration; maintains full torque at all output speeds; permits use of motor closely rated to the developed load to be driven; prevents stalling of motor; eliminates shear pins and other similar protective devices; and permits use of standard motor (a-c and d-c), eliminating the use of high torque high slip motors. The drive has been applied to slitters and cutters, and is adaptable to numerous other applications in the paper industry.

## "Prophecy and Planning"

The evening of the first day of the meeting was given over to a reception and dinner at the Adelphia Hotel. The reception was arranged by Downingtown Mfg. Company; while J. E. Rhoads & Sons secured Dr. Canby Balderston, Dean of Wharton School, University of Pennsylvania, as guest speaker for the dinner program and Charles Southwell as leader of the singing.

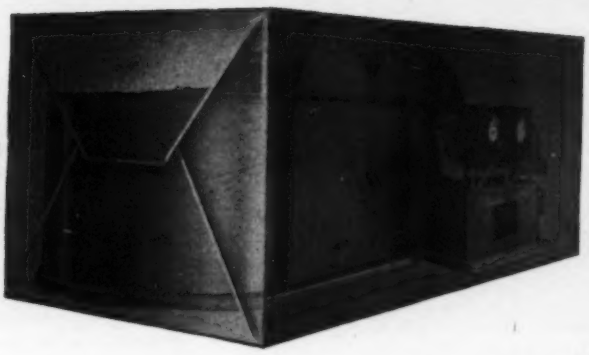
Dr. Balderston spoke on Prophecy and Planning. In part, he said that prophecy is an essential element in policy making and in planning; that prediction would be mere guesswork without the assistance of standards; and that the farther planning is removed from day to day operation, the more important it is to keep plans general. Muddling through, he added, is the alternative of planning and that is scarcely good enough.

In looking to the future, Dr. Balderston stated that our population has increased about nine million since Pearl Harbor; that we have less autos now than then; and that there still is a terrific demand for autos and housing, as well as for other durable and nondurable goods.

Dr. Balderston also said that purchasing power is here; that demand is here; and that inventories are small in relation to sales. In the case of small inventories, he commented that here is one area of management where efficiency has increased.

Dr. Balderston added that rising prices will bring pressure for wage increases; that wages next year will be higher than now; that next year will witness more strikes than at the moment; and that through these actions, the inflational spiral will be

**IT'S READY FOR YOU... IN ONE COMPLETE PACKAGE**



Remember when you thought of that "dream" machine and compared it with your less efficient existing equipment. Think again. You wanted: 1. Efficient use of power. 2. Batch operation for control of chemical and color requirements. 3. Positive control of pressure between refining elements (roll and bed-plates). 4. Perfect circulation (elimination of dead areas). 5. Speedy and complete dumping. 6. Ability to produce like stock characteristics at any time. 7. Flexibility of stock treatment. 8. Efficient use of floor space.

Reports from scores of installations actually prove that these results, and many more, are attained with use of the JONES-BERTRAMS PATENT BEATER.

**JONES-BERTRAMS PATENT BEATER**
*(Stainless Steel)*

**Jones**

E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.
Builders of Quality Machinery for Paper Mills

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given another term. As for himself, Dr. Balderstone said that he would prefer a slight depression.

The group singing, led by Charles Southwell, revealed a spirit of good fellowship. Participation on the part of the audience to the requests of Dr. Southwell was spontaneous and active. At least one member of the audience said that he hadn't carried a tune in years but that he did that night—a real tribute to a good leader.

With a few pertinent remarks by W. F. Gillespie, president of TAPPI, the dinner meeting at the Adelphia Hotel was adjourned.

### Post Convention Plant Visitations

Visitors were welcomed by a number of industrial firms in Philadelphia and vicinity on the day following the convention. Among the firms that participated in this open house were: Brown Instrument Company, De Laval Steam Turbine Company, Downingtown Manufacturing Company, Samuel M. Langston Company, E. J. Lavino & Company, Link-Belt Company, Lukens Steel Company, Moore & White Company, SKF Industries, Inc., and Westinghouse Electric Corporation.

◆

## DOCTORS KRESS AND HEUSER ADDRESS CHEMICAL GROUP

"New Trends in the Evaluation of Chemical Wood Pulps" was the subject of a lecture delivered by Dr. Emil Heuser of The Institute of Paper Chemistry on November 18 at a meeting of the Northeast Wisconsin Section of the American Chemical Society in Appleton, Wisconsin.

The occasion was the seventeenth anniversary of the first meeting of the section, and the meeting was preceded by a dinner honoring the charter members. Dr. H. F. Lewis, dean of The Institute of Paper Chemistry and first chairman of the section, presided. Other charter members present were S. F. Darling; Robert McMillan, professor of chemistry at Lawrence College; J. R. Fanselow, staff superintendent, Kimberly-Clark Corporation; J. O. Frank, head of the Chemistry Department, State Teachers College, Oshkosh; Otto Kress, technical director, The Institute of Paper Chemistry; A. Lewenstein, chief chemist, Appleton Coated Paper Company; and H. A. Rothchild, technical director, Kimberly-Clark Corporation.

Following the dinner Dr. Otto Kress spoke informally on the growth of the pulp and paper industry and the chemical industry during his lifetime, and how economic situations had affected technological developments.

The lecture by Dr. Heuser dealt with information, as yet unpublished, on molecular chain length distribution obtained by fractionation methods applied to certain types of wood pulp and cotton.

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## WESTERN NEW YORK TAPPI GROUP HEARS JOHN CATLIN ON STATISTICAL CONTROL

The regular monthly meeting of the Western New York Group of the Empire State Section of the Technical Association of the Pulp and Paper Industry was held November 19, 1947, at the Prospect House, Niagara Falls, New York.

Wm. Monsson, chairman of the program committee, introduced Mr. Ireland, chairman of the Niagara Branch of the Canadian Pulp and Paper Association who spoke briefly on their program, which is to include a series of mill visits in 1948. All those present were invited to attend.

Mr. Monsson then introduced the speaker of the evening, John Catlin, of the Kimberly-Clark Corporation, Neenah, Wisconsin, who spoke on "Statistical Quality Control in the Paper Industry." Mr. Catlin opened his talk by defining Statistical quality control as the use of chemistry, physics and mathematics of processes, materials and products for the control of product quality. He treated the history of control in the paper industry and emphasized the importance of the contributions to the industry made by technically trained men.

The speaker pointed out that the present methods of control and the present control instruments do not give the complete picture of product quality. It is not only the quality of paper shown by averages of tests that is important, but also the variation between tests. Statistics are of use in control in showing what variations can be expected as a result of a series of average tests. Mr. Catlin said that it has been possible as a result of experience with statistics, to improve judgment in regards to machine operation, to improve the system of paper inspection and to write and fill improved specification contracts with their customers. He also pointed out that statistics is not the answer to all problems of control, but that it goes much further than present control methods. Until such time as more and better control instruments are designed and built, statistical quality control offers a decided improvement over present methods of control.

Before adjourning, Mr. Monsson gave a preview of future meetings. The December 10, 1947, meeting will be a panel discussion on "Pulp Stock Preparation," and the January 12 (1948) meeting will hear Dr. John McGovern of the Forest Products Laboratories speak on "Semichemical Pulps."

Approximately 70 technical men from local and surrounding industries, including guests from Canada and Erie (Pa.), attended the meeting.

Dr. A. H. Nadelman, general chairman, provided over the meeting.

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## CANADIAN TECH. SECTION ANNOUNCES LOCATION AND DATE OF ANNUAL MEETING

The 1948 annual meeting of the Technical Section, Canadian Pulp and Paper Association, will be held at the Mount Royal Hotel, Montreal, Quebec, on January 28, 29, and 30. The program will include papers on wood chemistry, engineering and paperboard. As in the past, a wide variety of informal group discussions will be presented by the different committees.

Nonmembers of the Technical Section are invited to attend both the annual and summer meetings of the Section. The January meeting extends through the three full days allotted to the convention, and delegates should arrange to remain until 5 p.m., Friday. Since the Technical Section does not handle room reservations, requests for accommodation should be addressed directly to the hotel and should include information concerning arrival and departure times.

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## COMING EVENTS

Jan. 12-16—National Materials Handling Exposition, at the Public Auditorium, Cleveland, Ohio.

Jan. 28-30—Annual meeting of the Technical Section, Canadian Pulp and Paper Association, Mount Royal Hotel, Montreal, Canada.

Feb. 2-6—Eighth International Heating and Ventilating Exposition, Grand Central Palace, New York City.

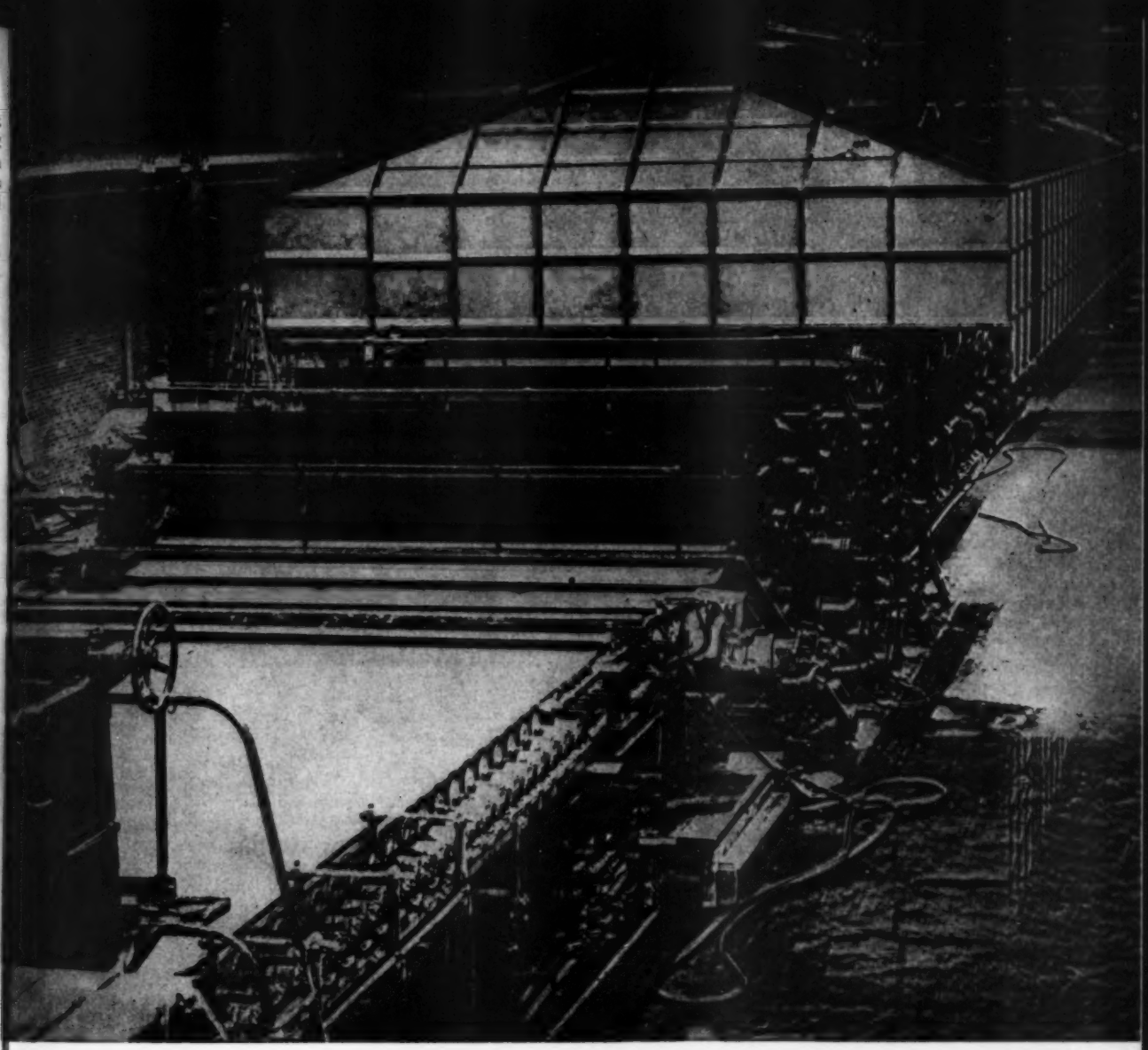
Feb. 15-19—First 1948 regional meeting of the American Institute of Chemical Engineers, Roosevelt Hotel, New Orleans.

Feb. 23-26—Annual meeting of the American Paper and Pulp Association and paper groups, at the Waldorf-Astoria Hotel, New York City.

Feb. 23-26—Annual meeting of the Technical Association of the Pulp and Paper Industry, at the Commodore Hotel, New York City.

### STATED MEETINGS

Chicago Professional Paper Group meets the third Monday of each month at the Chicago Bar Association, Chicago, Illinois (except July and August). The March meeting has been changed from the regular date of March 15 to March 22.



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**PUBLICATION PAPERS**

Many of the telephone books, directories, and publications in use today are printed on paper made on this Bagley & Sewall fourdrinier machine.

This 218" machine produces a 204" trimmed sheet. Another example of Bagley & Sewall designing and manufacturing skill -- covering an experience of seventy-seven years. In our plant at Watertown some of the largest and fastest paper machines in the world have been built.

When considering your next paper machine, get in touch with us. Our sales engineers will gladly work with you.

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## TAPPI ENGINEERS VISIT DOWNINGTOWN MFG. CO. AND LUKENS STEEL PLANTS

On November 6, the day following the close of the TAPPI Engineering Conference in Philadelphia, about 100 of those who attended the meeting boarded special chartered busses for the visit to the plant of the Downingtown Manufacturing Company and the Lukens Steel Company.

The local visitation was highlighted by a luncheon at the Coatesville Country Club at which the visitors were guests of the Downingtown Manufacturing Company and Lukenweld Division of Lukens Steel Company.

Upon arrival at the Downingtown plant, the group, headed by R. G. Macdonald, secretary of TAPPI, was welcomed by R. T. Street, president, and Enright A. Ellis, vice president of the Downingtown Manufacturing Company.

The visitors first inspected the new engineering department building. This large room is air-conditioned, with flourescent lighting, and it contains the very latest in modern equipment.

The men next assembled in the reception room where they inspected prints of new fourdrinier and cylinder board machines and were grouped for the trip through the plant. Company sales engineers and department heads, wearing white carnations, acted as guides.

The first department visited was the suction roll assembly and testing corner of the erecting shop which, just a few days earlier, had contained a huge wall board press part.

*Relaxing in the office of E. T. Street, president of Downingtown Manufacturing Co., during TAPPI plant visitation are: Left to right—R. G. Macdonald, TAPPI secretary; Mr. Street; Enright A. Ellis, vice president of Downingtown*

The technical men saw suction rolls of all kinds at various stages of assembly, a group of various parts and a completed rubber-covered suction press, 34 inches in diameter by 236 inches wide. A sign over the roll asked the men to write their guess as to how many holes it contained on a slip of paper with their names, and put it in a box for a prize. Many drew off to themselves for some private calculating.

The groups then went into the pattern shop where the patterns for paper machine parts are made; then into the carpenter shop where wood parts of vats, etc., and special shipping boxes are built; and then again into the erecting shop to see a Downingtown welded stainless steel vat and a wood vat with cast iron ends for board machines.

Then they continued through the machine shops, seeing cylinder moulds finished and under construction, dryers being machined, suction rolls being drilled, etc. They walked through the storage yard, passed the dry testing building, walked through and around the foundry where dryers and other machine parts are cast. In the assembly department, they saw floor drive units, plunger stuff pumps, Downingtown-Weiner refiners and stock regulating valves.

After spending about two hours in the plant, everyone returned to the company offices and again boarded the chartered busses for the Coatesville Country Club nearby, where luncheon was served.

The luncheon was without formalities. A short welcome address was given by Fred Wiese, of Lukens Steel. Paper machinery firm representatives were introduced by E. T. Street, president of Downingtown. Mr. Street then made the announcement that D. S. Corneal had come closest to guessing the number of holes in the Downingtown Suction Press Roll. The roll

*Speakers table at luncheon given TAPPI visitors at the Coatesville Country Club. Seated fourth from the right is E. T. Street, president of Downingtown Manufacturing Co. At his left (third from right) is J. F. Wiese, vice president in charge of sales, Lukens Steel Company. These two companies were hosts at the luncheon*

# NOW, GENTLEMEN....

# ....LET'S DO A LITTLE COMPARING

We sat across the table from several superintendents of well-known mills out our way. We corresponded with others, some of them out on the coast. You know them well.

We asked the questions. They produced the answers—from carefully compiled records on ORR-CHEM performance. And because the figures are their figures, not ours, they should be doubly interesting.

Already many mills are using ORR-CHEMS. Already most grades are represented. So it is high time you also gave ORR-CHEM treated felts a chance to prove their case on your machines.

¶ Be certain of length and width measurements when you order.

*"Felt started on the 1st, was taken off on the 15th. This is 14 days vs. our average of only 9 days. Still good enough to be used as press felt."*

*"Your treated, first press felt ran 18 days against average of 13 days. Weight, size and drainage O. K. Ordering more at once."*

**THE ORR FELT & BLANKET CO.**
PIQUA, OHIO

**PERFORMANCE**

**One of our larger board mills has already used several ORR-CHEMS. Their average felt cost per ton has been reduced from $1.21 to $1.04 per ton.**

***ANALYSIS***

***Based on your tonnage figures and a $.17 per ton saving, figure for yourself what such an economy could mean to you.***

●

**PERFORMANCE**

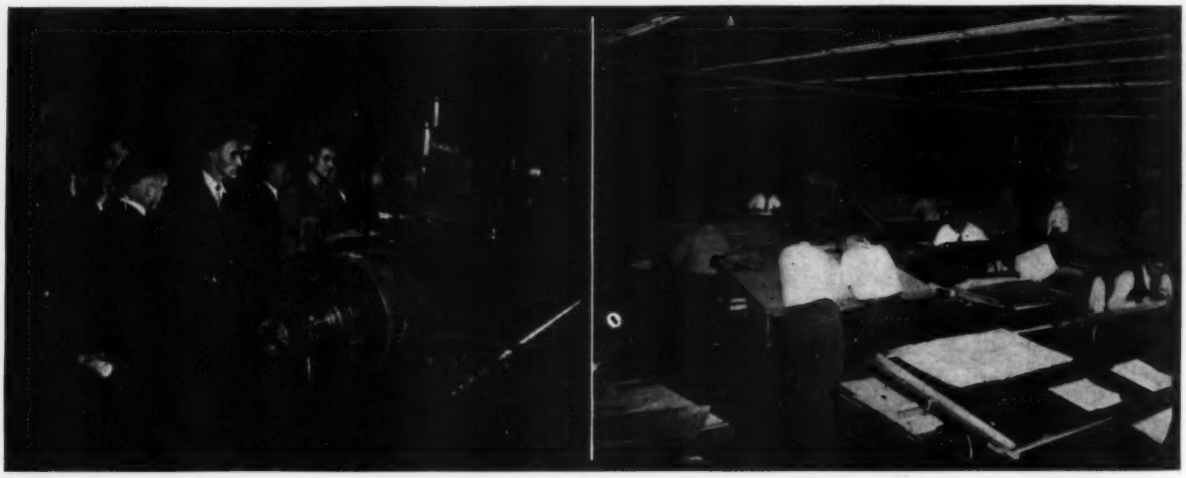
**ORR-CHEM felt ran 10 days on tissue and produced 457 tons at cost for felting of $1.20 per ton, or $550.23 total felt cost. The untreated felt ran only 7 days and the felt cost per ton stood at $1.70 when it came off. Boiled down, the ORR-CHEM saved $.50 per ton of production, or $228.50, on 457 tons produced—a handsome return on a $547.00 investment.**

***ANALYSIS***

***Using $.50 per ton as your saving, how would you have fared on felt costs? Again —figure it out for yourself.***

# ORR-CHEM

*TAPPI visitors are shown here while making a visitation tour of the plant of Downingtown Manufacturing Co., Downingtown, Pa.*



actually had 215,232 holes; while Mr. Corneal guessed 211,900. His prize was boxed, and it was announced as "a bunch of carnations." Mr. Corneal was probably relieved to find it was something much more useful—especially when one is thirsty.

Seated at the speakers table were: E. T. Street, president of Downingtown Manufacturing Company; J. F. Wiese, vice president in charge of sales, Lukens Steel Company; Enright A. Ellis, vice president, Downingtown Manufacturing Company; R. G. Macdonald, secretary of TAPPI; B. A. Malkin and H. E. Cunningham, Dominion Engineering Works in Canada; H. C. Moore, Beloit Iron Works; W. M. Lesson and J. W. Crocker, Sandy Hill Iron & Brass Works; Alex. McInnes, Pusey & Jones Corporation; P. J. Jerardi, The Black-Clawson Company; and Harry Farra, Moore & White Company.

At Lunkenweld, special emphasis was placed on the manufacturing facilities where the fabrication of jacketed steel dryer rolls and the design and manufacture of paper-making equipment have been specialties for some time. Lukens Clad Steels also are finding larger use in the paper-making industry where their corrosion-resistant qualities give many advantages. The group was shown the manufacturing facilities of the Clad Steel Department. They also watched the rolling of plates on Lukens 206-inch mill, shearing, bending, pressing and blanking operations in Plants 1, 2 and 3 of By-Products, and the spinning of heads in Lukens Flanging Department. The visitation also included the new sodium hydride descaling and pickling plant—the largest and most complete in the world—for the rapid and efficient removal of oxide scale from metal surfaces.

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▶▶▶ FOR THE SECOND YEAR, the National Materials Handling Exposition will be conducted in the Public Auditorium, Cleveland, January 12 to 16. Exhibit space totaling almost 200,000 square feet has been contracted for by 154 exhibitors. Occupying nearly three times the previous area, the exposition will rank among the top fifteen national industrial expositions, Edwin J. Heimer, chairman of the committee, has announced. In addition to the commercial exhibits, a conference on materials handling, a materials handling theater, and an institutional presentation of equipment and systems will be presented.

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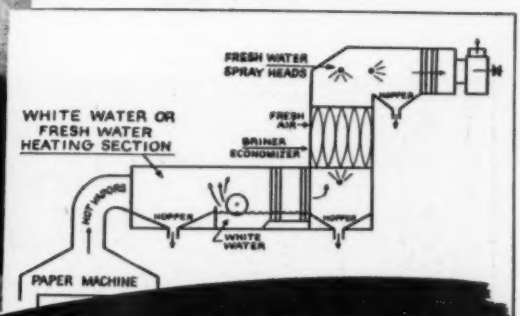
## TAPPI'S 1948 OFFICERS NOMINATED BY COMMITTEE

In accordance with Article VII, Section 2 of the constitution of the Technical Association of the Pulp and Paper Industry, the 1948 Nominating Committee has completed its slate of candidates for consideration of the Association by letter ballot to be sent from the headquarters office in December.

It is the practice of the Nominating

# You can pick from $3000 to $6000 yearly out of the air!




## ROSS AIR SCRUBBER

Depending upon the type of machine and volume of exhaust, the cleaning and reuse of exhaust air by means of the new ROSS Air Scrubber can produce such savings. And that is only one of its specific functions. It efficiently heats white water; it cleans air for calender and motor cooling and other fresh air needed in the mill.

Another of the many new ROSS developments that you should know about. For the newest in paper making methods, get in touch with our nearest office.

Write for copy of our Bulletin No. 205 which gives complete information on the ROSS Scrubber. Copy will be sent without obligation.

ROSS SYSTEMS

**J. O. ROSS ENGINEERING CORP.**

DESIGNERS AND BUILDERS OF AIR PROCESSING SYSTEMS

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Committee to select but one candidate for each office to be filled. However, it is provided in Art. VII, Sec. 3, that other nominations, if signed by at least 25 voting members, may be submitted to the secretary in writing on or before November 20, and if the nomination so made is accepted in writing by the nominee, the name shall be placed on the official ballot.

The principals of the 1948 Nominating Committee consisted of J. D. Malcolmson, Robert Gair Company, chairman; P. W. Bartholomew, Hawthorne Paper Company; W. F. Holzer, Crown Zellerbach Corporation; John L. Parsons, Hollingsworth & Whitney Company; and Charles Carpenter, New York and Pennsylvania Company.

The slate selected by the committee is as follows:

President (1 year)—Wilbur F. Gillespie, Gaylord Container Corporation, Bogalusa, La.

Vice President (1 year)—Albert E. Bachmann, Missisquoi Corporation, Sheldon Springs, Vt.

For Executive Committeemen (3 years):

Harold W. Bialkowsky, Weyerhaeuser Timber Company, Everett, Wash.

Frederick C. Goodwill, St. Regis Paper Company, Deferiet, N. Y.

Willis B. Lincoln, Jr., Inland Container Corporation, Indianapolis, Ind.

Albert L. Sherwood, Sutherland Paper Company, Kalamazoo, Mich.

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## DATE SET FOR COLLEGE OF FORESTRY ALUMNI LUNCHEON

The annual luncheon and get-together of the New York State College of Forestry Alumni will be held during the TAPPI Convention in New York on Wednesday, February 25, 1948, at the Hendrick-Hudson Room of the Hotel Roosevelt.

All alumni and their friends are cordially invited to attend and reservations may be obtained by notifying Mr. Lionel M. Sutherland, Sutherland Refiner Corporation, 143 East State St., Trenton, New Jersey, who is chairman of the committee for the 1948 luncheon.

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▶▶▶ THE FIRST 1948 Regional Meeting of the American Institute of Chemical Engineers will be held at the Roosevelt Hotel in New Orleans, February 15-19. Two symposia are being planned on "High Temperature Refractories" and "Low Temperature Insulation" along with several general chemical engineering papers. E. A. Gastrock, head of the Engineering and Development Division at the U. S. D. A. Southern Regional Research Laboratory in New Orleans, is general chairman for the convention.

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▶▶▶ MANY STRIKING advances in designs for heating, ventilating, and air conditioning will be demonstrated at the Eighth International Heating and Ventilating Exposition in Grand Central Palace, New York, February 2 to 6. Displays will include every known variety of method and apparatus for all classes of demand-industries, institutions, commercial establishments, and homes. Charles F. Roth is manager of the exposition which is sponsored by the American Society of Heating & Ventilating Engineers.

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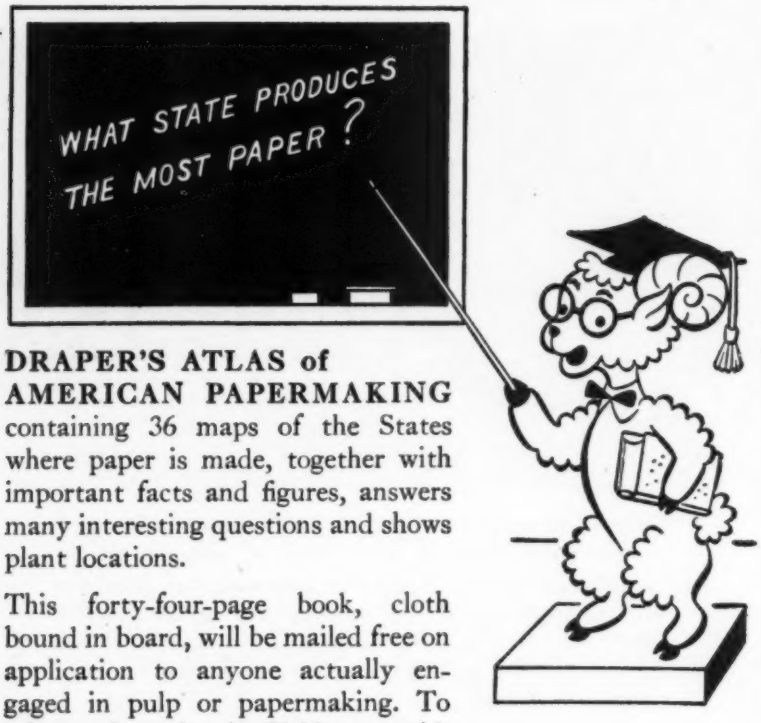
▶▶▶ THE MAGAZINE published by American Cyanamid Company's Plastics Division (New York City), *Plastics Newsfront*, has received the 1946-47 "Best of Industry Award" from the Direct Mail Advertising Association at its 30th Annual Convention in Cleveland. The magazine will be part of an exhibit shown before advertising and graphic arts groups during the coming year, and then will be placed in various educational files and libraries for reference purposes.


*What do you know about Paper?*




**DRAPER'S ATLAS of AMERICAN PAPERMAKING** containing 36 maps of the States where paper is made, together with important facts and figures, answers many interesting questions and shows plant locations.

This forty-four-page book, cloth bound in board, will be mailed free on application to anyone actually engaged in pulp or papermaking. To others, the price is $2.00 postpaid, while the edition lasts.

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**DRAPER BROTHERS COMPANY**

*Woolen Manufacturers Since 1856*

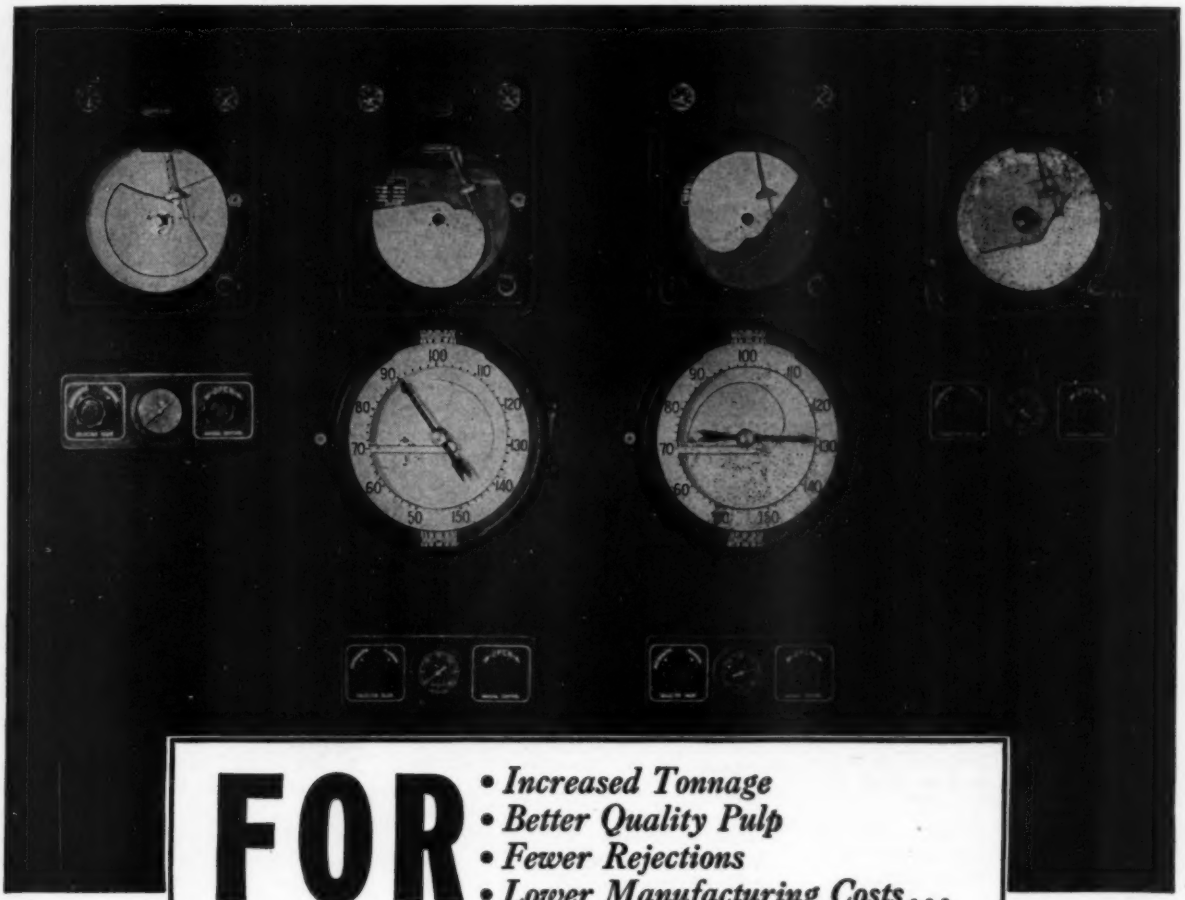
CANTON, MASSACHUSETTS

Ralph E. Briggs, Sales Manager

BRADFORD WEST, Pittsfield, Mass. — WILLIAM N. CONNOR, Jr., Canton, Mass. — L. H. BREYFOGLE, Kalamazoo, Mich.

WALTER A. SALMONSON, 519-20 White Bldg., Seattle, Wash. — L. L. GRIFFITHS, Jr., Kalamazoo, Mich.


Answer to Question No. 1 on Census for 1945 U.S. tons 1,542,114 New York,



# FOR

- *Increased Tonnage*
- *Better Quality Pulp*
- *Fewer Rejections*
- *Lower Manufacturing Costs...*

## USE MASONEILAN DIGESTER CONTROLS

Remove as many variables as possible at the Digester and keep those remaining under strict control . . . then you're sure to get uniform pulp at decreased cost.

Masoneilan Digester Controls do just that by taking the guesswork from the cooking process. Once a cycle is determined, these controls will repeat any selected program year after year. Here are the advantages Masoneilan Digester Controls give you —

**A UNIFORM PULP** — by holding a constant time and pressure schedule and by varying the maximum cooking temperature to compensate for variations in the amount of free $SO_2$ in the cooking acid.

**FEWER REJECTIONS** — by controlling the selected and maximum temperature schedule.

**UNIFORMITY FROM COOK TO COOK** — Masoneilan automatic time cycle controllers consistently repeat and record the pressure and temperature of successive cooks.

**LOW STEAM CONSUMPTION** — Program controllers prevent over-temperaturing — hence over-cooking. On indirect circulating systems hot condensate is returned to boiler house at considerable saving.

**UNIFORM STEAM CONSUMPTION** — cycle controllers allow for proper spacing of boiler load.

**GAS RECOVERY** — time cycle control of relief gas properly proportions it to the recovery process to keep uniform strength in the reclaimed acid.

**GREATER PRODUCTION** — accurate timing and scheduling of each cook produces greater tonnage.

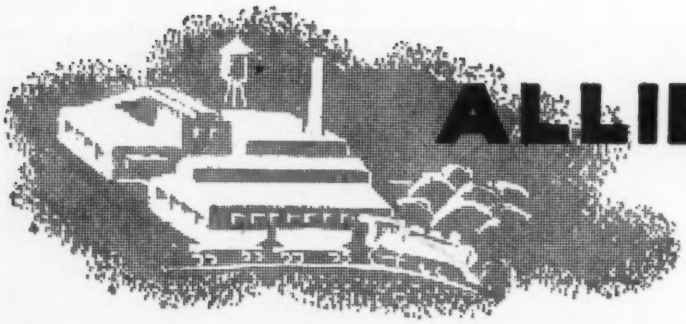
**INCREASED PULP STRENGTH** — pop and fold strength increase due to uniformity of the temperature cooking schedule.

**DECREASED BLEACHING COSTS** — uniformity of pulp decreases the chlorine requirement.

*Add your name to our list to receive new bulletin now in preparation*

## MASON-NEILAN REGULATOR CO.

1196 ADAMS STREET, BOSTON 24, MASS., U.S.A.




## DIATOMACEOUS EARTH WILL BE TAILOR-MADE AT NEVADA PLANT OF EAGLE-PICHER CO.

A new plant fitted with the latest equipment to process diatomaceous earth to exacting, individual plant specifications for the paper industry has just been completed at Clark, Nevada, by the Eagle-Picher Company, of Cincinnati.

This new plant is geared to handle tailor-made grades of diatomaceous earth. According to T. C. Carter, company vice president in charge of insulation and diatomaceus earth products, the Eagle-Picher deposit is sufficient for several hundred years supply and suitable for surface mining methods. The new diatomaceous earth division is part of the planned expansion program of Eagle Picher. The new product, which will be turned out in large quantities, is called Celatom.

The company's unique flexible grinding, classifying and calcining plant is among the most modern of its kind. The air classification system allows for precision separation and classification to a degree not possible to maintain by screen, sieve and mechanical methods alone.

Flexibility of the equipment also makes possible the blending of various particle sizes into any desired combination. This permits Celatom to be processed to any specification required to a degree unattainable in less modern plants. This will be significant to the paper industry because the new plant can develop any particular grade required for any product.

An Eagle Picher organization of specially trained chemical engineer field representatives will assist paper manufacturers in fitting Celatom to their specific product or production methods.

◆

## RUST ENGINEERING CO. FORMS NEW DIVISION OF CHEM. PROCESS DESIGN

Entering the chemical process design field, The Rust Engineering Company, Pittsburgh, one of the nation's largest engineering-constructor firms, has announced formation of a new process engineering division to extend the design and construction services it offers to the chemical, petroleum, and related industries.

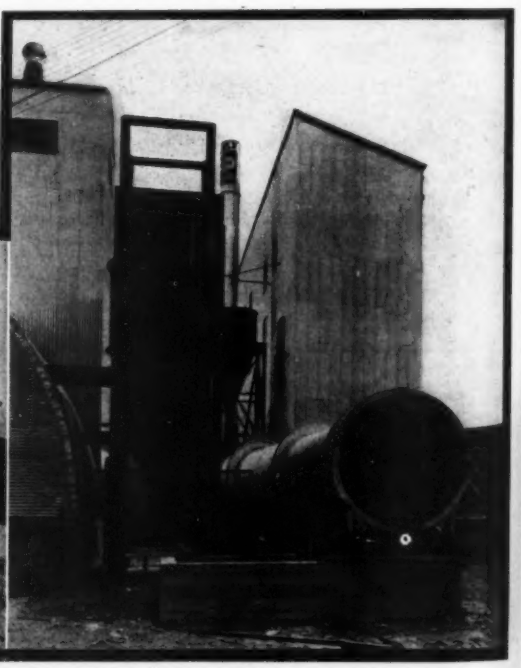
In addition to the process design service already offered by the company to the paper industry, the new division will make available process engineering in the petroleum, petrochemical, organic and fine chemical fields, S. M. Rust, Jr., president, and in making the announcement.

This expansion of facilities places the company in a position to undertake entire execution of design, drafting, purchasing and construction of chemical process plants. In addition it will offer consulting service for planning, conducting and supervising research and development programs, and extending the results to commercial practice.

To direct the new program, four experienced process engineers have joined the firm as of December 1. These men, who are widely known in the chemical industry, are Dr. John A. Patterson, Dr. Wendell W. Waterman, Leonard A. Wasselle, and Walter L. Bass.

Dr. Patterson, recently chief project engineer of Publicker Industries, Inc., has also served with Atlantic Refining Company, Standard Oil Development Company, and DuPont Ammonia Corporation. Dr. Waterman, formerly associate director of development for Publicker, was for nine prior years associated with the Standard Oil Development Company. Mr. Wasselle was for nine years with Charles Pfizer and Company, Inc., prior to going with Publicker as process engineer. Mr. Bass served for nine years as a process engineer with the Lummus Company and later with Publicker as project engineer.

***BELOW—The Eagle-Picher Celatom deposit is hundreds of feet thick and suitable for surface mining methods***



***RIGHT—Calcination of Celatom under controlled conditions in this rotary kiln improves physical properties of the natural material***

Part of the picture of famous products

# WALDRON *Processing* MACHINES

Waldron Reverse Roll Coater for operation at speeds up to 300 ft. per minute on lacquer type coating materials, higher for other types. One of many Waldron Coating Machines.

**WALDRON REVERSE ROLL COATERS FOR**

Pile Fabrics . . . Carpet . . . Paper Rolled Steel . . . Aluminum Foil Abrasive Coated Cloth . . . Cloth Paper Board . . . Wallpaper . . . Plastics and many other materials in the web.

Those welcome successors to glue or string—Pressure Sensitive Tapes—are examples of surface coating at its best. Wherever the coating must be of a uniform thickness, smooth, free of wrinkles, ribs or graining patterns, WALDRON COATING MACHINES are a "must". The model illustrated applies a uniform coating within a tolerance of not more than .0001" to .0002" and embodies the most advanced refinements in design and construction to assure pre-metered application of coating material and constant reliable production.

Waldron Coating has provided the basic idea for scores of remarkable new products and effects. The experience of our Research and Development Staff and the facilities of our Testing Laboratory are at your service. Investigate the possibilities for your product.

Coating Machines
Creping Machines
Embossing Machines
Floor Cov. Machines
Gumming Machines
Laminating Machines
Printing Machines
Rubber Mill Machines
Wall Paper Machines
Waxing Machines
Winders and Slitters
Special Design Machines

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BUILDERS OF QUALITY MACHINES SINCE 1827

The newly created process engineering division will offer to the chemical industry in general, comprehensive design facilities covering all phases of chemical process work.

In the past quarter century, through extensive experience in the building of paper plants and installation of paper process equipment, Rust Engineering has become a major designer of papermaking and related chemical processes. The new design division represents the outcome of the company's steady expansion in this phase of work in recent years.

◆

## ARTHUR C. DRESHFIELD HAS FORMED PARTNERSHIP WITH DR. C. B. HOLLABAUGH

Arthur C. Dreshfield, chemical engineering consultant to paper and paper board manufacturers, converters, and their chemical suppliers and to paper consumers, has announced the formation of a partnership with Dr. Cleveland B. Hollabaugh, of New York City.

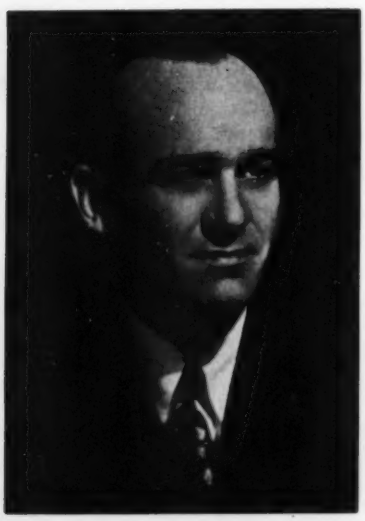
The firm will be known as Hollabaugh and Dreshfield and will maintain offices at both 112-27 177th Street, St. Albans, New York, and at 401 West Elm Avenue, LaGrange, Illinois. It will specialize in the fields of stock preparation, sizing, coating, saturating and laminating, and the chemical and engineering processes of those operations and their patent aspects.

The wider range of service offered will make available investigations of the state of the art to provide basis for the recognition of inventive concepts, to give warning of areas in which patent troubles may be encountered, and to evaluate the strength of adversely held patents which may stand in the client's path. Advice will be rendered in the organization and direction of patent departments and in the management of patent holdings. Technical assistance will be offered to the legal profession in planning and preparing patent litigation.

Dr. Hollabaugh received the degree of Bachelor of Science in chemistry from the University of Arkansas in 1927 and earned a Masters Degree in 1930 at the Pennsylvania State College, as a step to the award of a Ph.D. in physical and organic chemistry in 1931. His formal education was supplemented by studies in law with emphasis on patent, trade-mark, contract, and corporation law. He was registered to practice as a patent attorney in 1938 by both the United States and Canadian Patent Offices.

He was employed as a chemist by Hercules Powder Company in 1931 to study cellulose derivatives and was responsible for developing the first commercial coating composition of emulsified nitrocellulose lacquer. In 1934 he was transferred to the legal department to prepare and prosecute patent applications and to study infringement and validity. In 1938 he was assigned the task of organizing a patent department and became its manager in 1939. In that position he was responsible for all matters concerning the corporation's patent and trade-mark holdings and activities.

Dr. Hollabaugh is a member of the Technical Association of the Pulp and Paper Industry, The American Society for Testing Materials, The American Chemical Society, and is a Fellow of the American Institute of Chemists. He also belongs to the New York Patent Law Association.



*Dr. C. B. Hollabaugh*

*Arthur C. Dreshfield*

## COOPER ALLOY FOUNDRY CO. ISSUES SOUVENIR BOOKLET TO MARK 25th ANNIVERSARY

A deluxe booklet entitled "A Quarter Century of Pioneering in Stainless Steel Castings" has just been published by the Cooper Alloy Foundry Company, Hillside, New Jersey, to mark its twenty-fifth anniversary.

The first part of the booklet not only reviews step by step the history of the company from its founding, but brings in the story of stainless steel as well.

The second half of the book, which is devoted to a graphic presentation of "How Cooper Stainless Steel Castings are Made," includes a section specifically treating the outstanding work done by this company in developing stainless steel castings for use in sulphite mills. An extensive table in the back of the booklet lists the analyses, characteristics, and applications of Cooper Alloys. In this tabulation, special alloy designations are given for digester fittings, pumps, valves, fittings, etc., for sulphite mills.

The material is predominantly pictorial with artistic use of color, and the appearance of the booklet is enhanced by a silver cover.

The Cooper company will be glad to send a copy of this anniversary souvenir booklet to interested persons.

◆

## TIMKEN CO. UNDERTAKES CONSTRUCTION OF ROCK BIT PLANT IN COLORADO

The eight-acre site of the new $150,000 rock bit plant at Colorado Springs, Colorado, has been purchased by The Timken Roller Bearing Company, of Canton, Ohio. The plant was originally scheduled to be built by the Colorado Springs Chamber of Commerce and leased to the Timken company, but it was later decided that the company would build the plant.

Frank M. Givin, general foreman of the company's Mount Vernon plant, was named manager of the new unit, which is expected to go into production about December 1. A daily output of 10,000 rock bits a day has been scheduled and about seventy-five persons will be employed at the start.

◆

▶▶▶ A NEW SALES OFFICE has been established by Link-Belt Company, of Chicago, to serve customers in the western portion of the lower peninsula of Michigan. Peter Groustra, former district sales engineer at Detroit, has been appointed district sales manager in charge of the new office which is located in Grand Rapids, Michigan.

# Lukenweld Jacketed Drier Rolls

(Patents applied for)

"On the job" performance by Lukenweld *Jacketed* Drier Rolls in a wide range of industries proves their ability for faster, more efficient drying. Numerous installations show drying rate stepped up 15 to 25 per cent with no increase in steam pressure. When steam pressures were increased, drying rates were stepped up as much as 50 per cent. *That means increased output* to answer demands for greater production.

The double-shell design and welded steel plate construction of Lukenweld Jacketed Drier Rolls give these advantages: *Greater steam velocity* . . . steam is guided into the restricted area between inner and outer shell, resulting in *vastly improved heat transfer* properties. *Quick, positive condensate removal* . . . removal pipe revolves with the roll, taking out a definite amount of condensate and entrapped air with every revolution. High strength of rolled steel plate permits *safe operation at pressure of 350 psi and higher* . . . provides high dimensional stability.

Get the complete story about Lukenweld Jacketed Drier Rolls. Write for Bulletin 358. Lukenweld, Division of Lukens Steel Company, 408 Lukens Building, Coatesville, Pa.

***Sizes from 2 feet to 18 feet O. D. and over***

**LUKENS**
LUKENWELD DIVISION

**LUKENWELD**
**DRIER ROLLS AND DRYING MACHINERY**

## SANDY HILL WORKS BUILDS PAPERMAKING MACHINE FOR SOUTH AMERICAN COMPANY

A papermaking machine is being built at the Sandy Hill Iron and Brass Works, Inc., at Hudson Falls, New York, for a large South American firm. The machine will be one of the largest and fastest tissue machines to be erected in South America. It is one of several machines being built by Sandy Hill for South American firms.

The planning and erection engineer is Michael B. Gormely, general superintendent of the Warrensburg Pulp and Paper Corporation (Warrensburg, N. Y.) and previously paper mill superintendent of the Marinette Paper Company plant at South Glens Falls, New York. Mr. Gormely will leave in the near future to supervise the starting and operation of the machine for a period of years.

◆

▶▶▶ A CHANGE IN the name of one of its acidproof cements has been announced by The Pennslyvania Salt Manufacturing Company, Philadelphia. The product which had been called Asplit F cement has been renamed Pennsalt HF cement in conformity with other company-named products. The HF denotes the cement's complete resistance to hydroflouric acid in all strengths.

◆

## TWO SPECIAL CONFERENCES HELD BY R-S PRODS. CORP.

Group meetings were held recently by R-S Products Corporation with the purpose of informing its Valve Division representatives on the products and developments of its newly established Electronic Division, for future handling. A Western group meeting was held in Chicago, and the Eastern group at the company's plant headquarters in Philadelphia.

The Electronic Division is under the direction of David W. Hopkins, executive vice president of the company in charge of the Electronic and Valve Divisions, and under the immediate management of Donald C. Culver, Ch. E.

◆

## NEW RELIANCE PLANT AT ASHTABULA STARTS WITH OPEN HOUSE FOR 5,000

The new Ashtabula (Ohio) plant of Reliance Electric & Engineering Company swung into full production on November 15. On that occasion, the company held Open House for about 5,000 people from Ashtabula and neighboring communities. The guests included company employees, representatives of the Chamber of Commerce, the Y.W.C.A., Boy Scouts, and many other civic groups. Guides and hostesses who helped to make the visit to the plant both pleasant and educational included company employees, representatives of the Chamber of Commerce, the Y.W.C.A., Boy Scouts, and other civic groups.

Bands and choirs of local high schools, an employees' chorus, magicians, and refreshments made it an especially happy occasion for the youngsters; while for the grownups it was an opportunity to see in full operation the machines, equipment, and products of the company which have already created nearly 500 new jobs for Ashtabula residents.

◆

▶▶▶ PURCHASE OF a two-story and basement building in Philadelphia has been announced by the Leeds & Northrop Company, manufacturers of electrical measuring instruments automatic controls and heat-treating furnaces. The building was owned and occupied by the Automatic Temperature Control Company, Inc., which has started operations at a new location.

◆

## NEW COMPANY TO HANDLE SARAN-LINED PIPE AND FITTINGS—A DOW PRODUCT

A news release from The Dow Chemical Company, Midland, Michigan, announces that Saran Lined Pipe Company, a newly organized firm, will act as exclusive distributor for a recently developed specialty pipe and fittings.

The pipe and fittings, lined with Saran, a Dow plastic, was developed for use where highly corrosive materials are handled in manufacturing processes. It is expected to be of special use in the fields of metal processing and plating and in chemical, pulp, paper and synthetic textile manufacturing.

S. H. Blackmore, sales manager of the Saran Lined Pipe Company, whose offices are located in the Stephenson Building, Detroit, said that his firm plans to establish sales representatives and jobber outlets to handle the product throughout the country.

◆

## MONSANTO CO. ISSUES 250,000 NEW SHARES OF PREFERRED STOCK

A registration statement was filed recently with the Securities and Exchange Commission by Monsanto Chemical Company to cover an issue of 250,000 shares of cumulative preference stock, series B, carrying a $4.00 dividend rate.

The stock is to be offered to the public through an underwriting group to be headed by Smith, Barney & Co., New York City, at a price to be fixed by the Board of Directors of Monsanto. The stock will be redeemable during various periods at premium prices to be fixed shortly before the public offering date.

The proceeds of the issue will be used for the general corporate purposes of the company, including its expansion program.

◆

## ROSS IRWIN ENTERS FIELD OF CONSULTING ENGINEERING

With twenty years of experience in the power plant boiler field, Ross Irwin has established his own business as a power plant consultant.

Mr. Irwin has served as chief engineer of the Springfield Boiler Company, Springfield, Illinois, for the past two years; he also has served as vice president of that company. He is well known in consulting engineering work in the Middle West and as a consulting engineer, he will specialize particularly in helping operating engineers obtain and maintain optimum operating results with existing equipment. He also will be available as a consultant on the steam generating portion of new plant design. He is a member of the ASME.

The new headquarters will be located in Springfield, Illinois, P. O. Box 178.

◆

▶▶▶ THE DENVER representatives of the Link-Belt Company, Schloss & Shubart, have moved from the Boston Building to 1626 Wazee Street. In addition to continuing as Link-Belt sales representatives Schloss & Shubart have been appointed stock-carrying distributors and will now render a complete on-the-scene warehouse service.

◆

▶▶▶ A MILL DESIGNED to produce 250 tons of talc daily will be constructed near Fowler, New York, by James Stewart & Co., Inc., who have been awarded the contract by R. T. Vanderbilt Co., Inc., New York. This will mark the Vanderbilt Co.'s initial entry into the talc producing field in this area. The company specializes in the manufacture and technical selling of chemicals and minerals.

◆

▶▶▶ HEADQUARTERS OF L. N. Harrison, southeastern district manager of the Votator Division of The Girdler Corporation (Louisville, Ky.), have been changed from Charlotte, North Carolina, to 505 Forsyth Building, Atlanta, Georgia.

THE PA

# COMPLETE *Prefabricated* PIPING SYSTEMS

## *for Modern* POWER PLANTS

When you modernize an existing piping system or install a completely new one—shop fabrication and field erection by Pittsburgh Piping and Equipment Company can relieve you of many responsibilities and assure an installation that is superior in reliability and economy of operation.

P P & E shop fabrication is an advanced technique developed over a period of almost fifty years of specialization in high pressure, high temperature piping. It begins with the blueprint and ends only when the system is in operation.

The prefabricated sub-assembly shown—for a hydraulic piping system operating at a pressure of 2500 p.s.i.—is typical of the complex designs that are feasible in our shops, and which facilitate accurate, economical erection.

When you modernize your plant, entrust responsibility for the complete piping system to an expert. Consult our nearest representative.

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**AND EQUIPMENT COMPANY**

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Book Tower, Detroit — 10 High Street, Boston
525 Market Street, San Francisco — Heights State Bank Bldg., Houston
Whitehead Building, Atlanta

## SAFETY SCORES

▶▶▶ IN THE PAPER INDUSTRY Safety Contest, which began June 30, sixty companies have finished the first three months with perfect records.

The cumulative rate of 15.90 for all contestants for three months of the contest was 14 per cent below the rate of the same period of last year. Reduction is based on rates of companies competing in both contests. The Remanufacturing Division is showing the greatest reduction in rates 33 per cent. The smaller mills in Pulp and Paper (Division I) made the greatest reduction in their division. Following are the participants with a cumulative perfect score for July, August, and September.

### Division I—Pulp and Paper Mills

**Group A**

Anglo-Canadian Pulp & Paper Mills, Ltd., Quebec, Canada.

Consolidated Paper Corp. Ltd. (Wayagamack Div.), Three Rivers, Que.

Hollingsworth & Whitney Co. (Algonquin & Taconnet Mills), Waterville, Me.

**Group B**

Kimberly-Clark Corp. (Badger-Globe Mill), Neenah, Wis.

Marinette Paper Co., Marinette, Wis.

Crown Zellerbach Corp., Port Townsend, Wash.

St. Croix Paper Co., Woodland, Me.

**Group C**

National Gypsum Co. (Mobile Plant), Mobile, Ala.

The Mead Corp. (Sylva Div.), Sylva, N. C.

Bird & Son, Inc., Phillipsdale, R. I.

The Crystal Tissue Co., Middletown, Ohio.

Certain-teed Products Corp., Savannah, Ga.

Certain-teed Products Corp., York, Pa.

Container Corp. of America, Wabash, Ind.

The Lawrence Paper Co., Lawrence, Kan.

Riverside Paper Corp., Appleton, Wis.

**Group D**

Armstrong Cork Co., Pensacola, Fla.

United States Gypsum Co., Lisbon Falls, Me.

Hollingsworth & Whitney Co. (Abenaquis Mill), Madison, Me.

Hollingsworth & Vose Co., West Groton, Mass.

Certain-teed Products Corp., Dallas, Texas.

Container Corp. of America, Carthage, Ind.

Fort Orange Paper Co. (Paper Mill), Castleton, N. Y.

Container Corp. of America, Circleville, Ohio.

Fort Wayne Corrugated Paper Co., Vincennes, Ind.

Riegel Paper Corp. (Hughesville Plant), Riegelsville, N. J.

The Mead Corp., Nashville, Tenn.

United States Gypsum Co., North Kansas City, Mo.

Spaulding Fibre Co., Inc., Milton, N. H.

United States Gypsum Co., Oakmont, Pa.

National Gypsum Co., Garwood, N. J.

Strathmore Paper Co. (Woronoco Mill No. 1), Woronoco, Mass.

American Writing Paper Corp. (Gill Div.), Holyoke, Mass.

National Gypsum Co., Newburgh, N. J.

Certain-teed Products Corp., Buffalo, N. Y.

Container Corp. of America, Los Angeles, Calif.

Kimberly-Clark Corp., Kapuskasing, Ont., Can.

Container Corp. of America, Wilmington, Del.

Container Corp. of America (Western Container), Tacoma, Wash.

### Division II—Paper & Board Remanufacturing

**Group A**

Scott Paper Co., Chester, Pa.

The Flintkote Co., Chicago Heights, Ill.

Bird & Son, Inc. (Norwood Roofing Plant)

**Group B**

Oswego Falls-Sealright Corp. (Cap Div.), Oswego, N. Y.

Canadian Cellucotton Products Co., Ltd., Niagara Falls, Ont., Can.

Container Corp. of America, Fort Worth, Texas.

Old Colony Envelope Co., Westfield, Mass.

Container Corp. of America, Cleveland, Ohio.

A. B. Dick Co. (Lake Street Plant), Chicago, Ill.

Hammond Bag & Paper Co., Wellsburg, West Va.

**Group C**

Fort Wayne Corrugated Paper Co., Hartford City, Ind.

Bird & Son, Inc. (Chicago Roofing Plant), Chicago, Ill.

Gaylord Container Corp., Jersey City, N. J.

Ft. Wayne Corrugated Paper Co. (Rochester Div.), Rochester, N. Y.

Thilmany Pulp & Paper Co. (Bag Mill), Kaukauna, Wis.

Container Corp. of America (Container Div.), Los Angeles, Calif.

Orchard Paper Co., St. Louis, Mo.

The Flintkote Co. (Hollywood Paper Box Div.), Los Angeles, Calif.

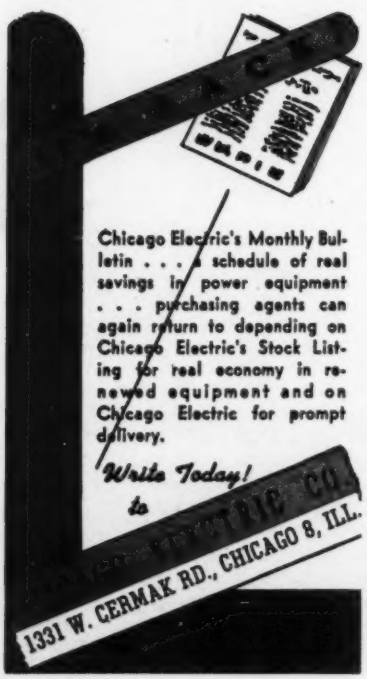
The Hankins Container Co., Chicago, Ill.

Essex Paper Box Mfg. Co., Newark, N. J.

Bay West Paper Co., Green Bay, Wis.

◆

▶▶▶ FIRST PLACE in the passenger car division of the National Fleet Safety Contest sponsored by the National Safety Council has been awarded to the Nekoosa-Edwards Paper Company (Port Edwards, Wis.) in recognition of outstanding achievement in the prevention of motor vehicle accidents. Nekoosa had seven vehicles entered in the contest operating a total of 92,240 vehicle miles without an accident. Sixteen companies from various sections of the country had fleets of motor vehicles entered in the contest.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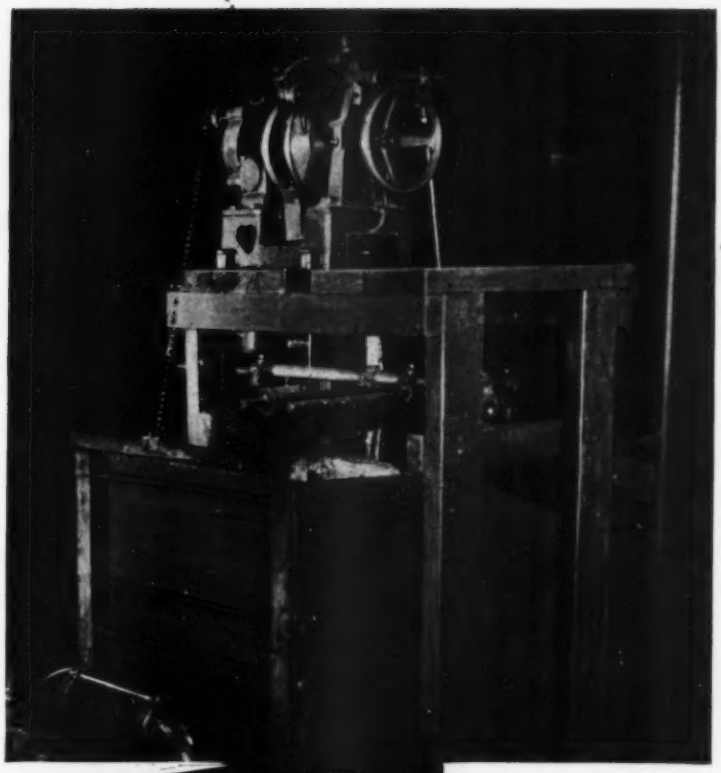

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when you standardize on the

# BIRD CONSISTENCY REGULATOR

On all kinds of stock, free or slow, less than 1% or up to 12% — at machine chests, stock chests, Jordans, knotters, brown stock washers, deckers or any other place you want consistency to be constant — the Bird Regulator keeps it on the nose and off your mind. Consistency is never more than 0.1% heavier or lighter than you want, even when there are sudden or potentially extreme variations.

*Let us send you a complete set of application diagrams.*

## BIRD MACHINE COMPANY

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# NAMES in the News

Douglas Nelson Spaulding WHITE CUYLAND Smith Clark Arthur Wolf Morris Simpson Kraft Bryan Temple

## PERSONALS

### PHILLIP LEBOUTILLIER ELECTED PRESIDENT OF OTTAWA RIVER PAPER CO.

Former assistant to the president of the Toledo Scale Company, Phillip LeBoutillier, Jr., was elected president of the Ottawa River Paper Company, Toledo, Ohio, at a recent meeting of the firm's board of directors. F. E. Smyser, former president, was elected chairman of the board.

Mr. Leboutillier came to Toledo with the Electric Auto Lite Company in 1939 and continued there until 1942 when he entered the Navy. Upon returning to Toledo in 1945, he became associated with the Toledo Scale Company. Mr. Smyser, one of the original organizers of the Ottawa River Paper Company in 1923, was named president in 1945.

◆

### MASONITE CORP. ANNOUNCES THREE EXECUTIVE CHANGES

At a recent board meeting of the Masonite Corporation (Wausau, Wis.), John M. Coates and Walter G. Stromquist were elected vice presidents and Ben O. Anderson was elected treasurer.

As vice president, Mr. Coates will continue with the executive duties he has performed the last two years as assistant to the president. He joined Masonite in 1939 as corporation counsel and was advanced to general counsel in 1942.

Mr. Stromquist, formerly assistant vice president and general sales manager, takes charge of sales and merchandising, succeeding Vice President E. L. Saberson, who will continue in active service as an adviser to the president. Mr. Anderson has been active in the company's accounting and financial affairs for twenty-one years. He was appointed assistant treasurer and comptroller in 1936.

▶▶▶ General counsel and public relations director of West Virginia Pulp and Paper Company, New York City, *E. Nobles Lowe,* was elected secretary of the company at a recent meeting of the board of directors. He succeeds Charles A. Cass, who retired in October after thirty-eight years' service in the office. Mr. Lowe became general counsel of the company in 1943, and in 1944 assumed the additional duties of public relations director.

◆

▶▶▶ A new sales engineer of the E. D. Jones & Sons Company (Pittsfield, Mass.) is *Thurston L. Yocum.* Mr. Yocum came to the firm from

*Thurston L. Yocum*

the Crown Zellerbach Corporation, which he served in numerous technical and engineering capacities at various Pacific Coast communities.

◆

### W. O. HISEY ADDRESSES LUNCHEON OF ROTARIANS

On December 1, W. O. Hisey, consultant for the Union Corporation of Johannesburg, South Africa, operating the South African Pulp and Paper Industries, gave an interesting talk at the luncheon meeting of the Rotary Club of Hudson Falls, in the Kingsbury Hotel, Hudson Falls, New York. Mr. Hisey served as associate professor of pulp and paper at the New York State College of Forestry from 1934 to 1944.

Motion pictures taken in the jungles of South Africa were shown by Mr. Hisey in connection with his address. He was introduced by Frank A. Juckett, president of the Sandy Hill Iron and Brass Works, Inc.

This is Mr. Hisey's first visit to this country since going to South Africa in 1944. He is studying new developments in the paper industry looking toward developing a kraft pulp and paper mill in South Africa. On his return, he expects to visit Australia, where he plans to study the use of eucalyptus for papermaking.

◆

### CHARLES GAST NAMED TO HEAD ETHYL CELLULOSE PROMOTION AT HERCULES

Charles H. Gast, manager of the Hercules Powder Company's Parlin, New Jersey, plant since 1945, has been named manager of ethyl cellulose promotion for the company's Cellulose Products Department in Wilmington, Delaware.

Mr. Gast joined the Parlin plant in 1915 as an engineer. From 1919 until 1942, he served as secretary and later as manager of the Wilmington Marine Terminal. In 1942 he left Marine Terminal to manage the Hercules-operated New River Ordnance Plant at Pulaski, Virginia. Later, he transferred to the Badger Ordnance Works, Baraboo, Wisconsin, as manager.

William H. Morrison, assistant manager of the Parlin plant since 1944, will become plant manager.

◆

▶▶▶ An addition to the staff of Container Laboratories, Inc., Indianapolis, is *Edwin S. Worden, Jr.,* as research executive. Mr. Worden has had ten years of experience as a packaging consultant for many large industrial companies in the United States. For three years during the war, he was with the Office of the Quartermaster General, Washington, D. C.

◆

▶▶▶ Sales Engineer *William E. Bryden* has been transferred from the Chicago office to the Cincinnati office of the Timken Steel and Tube Division of the Timken Roller Bearing Company, Canton, Ohio. Mr. Bryden joined the company in 1937 and became sales engineer for the New York district in 1940. He will be succeeded at Chicago by *William T. Strickland,* sales engineer.

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**"Super 7" V-BELTS**
Five Types — Sizes to suit every power transmission job.

**Texsteel, Texdrive, "Magic-Grip"**
— sheaves in a full range of sizes, grooves.

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Exact variations in speed, stationery or motion control.

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Speed variations up to 375% at the turn of a crank.

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Finest V-Belt engineering talent in the world—at your call.

TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.

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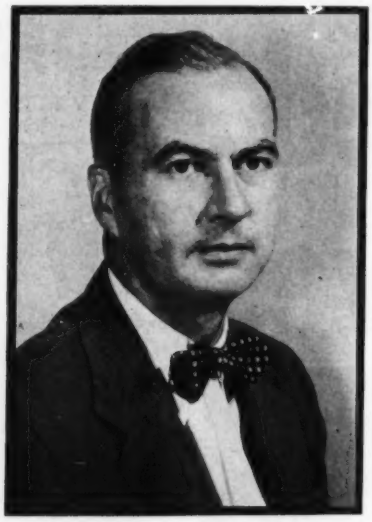
ALLIS-CHALMERS

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

▶▶▶ Former assistant general manager of the Blandin Paper Company (St. Paul, Minn.), *Robin A. Campbell,* recently became production assistant to the vice president in charge of production at Minnesota and Ontario Paper Company, Minneapolis.



**Robin A. Campbell**

Mr. Campbell has been affiliated with the paper industry for over fifteen years. As a Naval Supply Corps officer during World War II, he was responsible for procurement of paper and paper products.

◆

▶▶▶ Formerly with the Riley Stoker Corporation, of Worcester (Mass.), *Gustav A. Rehm* has been named chief engineer for the Springfield Boiler Company, Springfield, Illinois. Prominent among engineers to whom patents have been issued in the boiler engineering field, Mr. Rehm will head all engineering activities in connection with steam generators and related equipment. He succeeds *W. Ross Irwin* who has engaged in a private engineering practice in Springfield.

**Gustav A. Rehm**

◆

▶▶▶ *William M. Lee* has joined the Research and Development Department of the Pennsylvania Salt Manufacturing Company, Philadelphia, as supervisor of the Special Products Division. Mr. Lee's previous positions include chief chemist with the Thomas M. Royal Paper Company, of Philadelphia; research director of the Arabol Manufacturing Company, of New York; and chief of the chemicals and plastics section of the Office of the Quartermaster General during the war.

◆

▶▶▶ Responsibility for advertising, publicity, literature, and house organs, has been assigned to *John M. West,* newly-appointed director of the public relations division of Foster Wheeler Corporation, New York. A member of the company since January, 1940, he has worked in sales engineering as well as design of equipment.

◆

▶▶▶ The new manager of the wood processing machinery section of the Allis-Chalmers basic industries department, Milwaukee, is *Robert K. Prince.* Mr. Prince was associated with E. I. du Pont de Nemours & Company, Inc., the Pulp Bleaching Company (Orange, N. J.) and its affiliate, the D. J. Murray Manufacturing Company (Wausau, Wis.), for eight years prior to joining Allis-Chalmers in 1943. Between 1921 and 1936, he served as consulting engineer to the cellulose and chemical industries.

◆

▶▶▶ *Earl R. Nelson* has been appointed manager of the Cincinnati plant of Joseph T. Ryerson & Son, Inc., Chicago, succeeding *Wayne D. Dukette,* who will head the company's new steel-service plant in San Francisco. Mr. Nelson joined Ryerson in 1928, and has served as sales representative in the Dayton-Springfield, Ohio, area for the past ten years.

◆

▶▶▶ *Joseph F. Teti* has been elected president of Specialty Converters, Inc., (East Braintree, Mass.) and the P. L. Andrews Corporation, of New York City. Mr. Teti was employed by the Brown Company (Berlin, N. H.) from 1926 to 1934, and was superintendent of converting at the Gilman Paper Company, Gilman, Vermont, from 1934 to 1938. He joined the Andrews organization in 1939, and later organized Specialty Converters.

▶▶▶ A recent addition to the research department of the Nekoosa-Edwards Paper Company (Port Edwards, Wis.) is *William H. Burk.* One of his duties as research chemist is the investigation of new resins, coatings, softening agents, and similar materials to determine where they might fit into the manufacture or treatment of paper now being produced by Nepco.

**William H. Burk**

◆

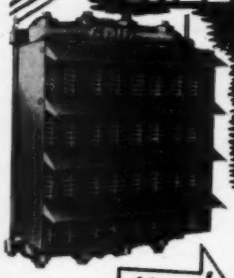
▶▶▶ The retirement of *John Walley,* construction foreman of the Nekoosa-Edwards Paper Company (Port Edwards, Wis.) for thirty years, has been announced. Mr. Walley's first assignment with the company was in 1917 on the Nekoosa tailrace and hydro unit. He has been in charge of all dam and power installations at all the Nepco plants.

**John Walley**

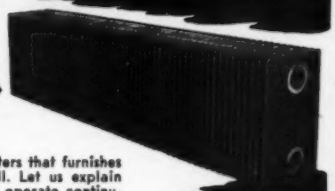
# GRID UNIT HEATERS

## WILL REMOVE FOG FROM YOUR BELLMER ROOMS

AND IN OTHER LOCATIONS WHERE ACID CONDITIONS MAKE WORKING DANGEROUS



HERE'S WHY-



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- No electrolysis to cause corrosion, breakdowns, leaks, or heating failures.

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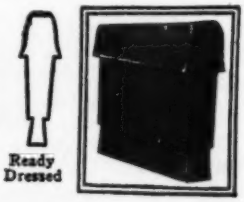

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*PULP AND PAPER MILLS*
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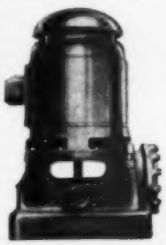
## Builds the Pump you require in Vertical and Horizontal Types

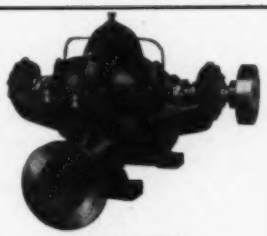


**PEERLESS DEEP WELL VERTICAL TURBINE PUMPS**

**Oil or Water Lubricated Types**

*Peerless Moturbo Drive illustrated*

Capacities: 15 to 30,000 g.p.m.; Lifts: to 1000 feet; Drives: electric, gear, belt or combinations. For wells 4" inside diameter and larger. Embodies patented Double-Bearing and Double-Seal Bowl construction.



**PEERLESS TYPE A CENTRIFUGAL PUMP**

General Specifications: Capacities: 50 to 70,000 g.p.m.; Heads: 15 to 300 feet; Sizes: 2" to 42" discharge; Drives: electric and other types from 1 to 1000 h.p.; Type: single stage, double suction, split-case, ball bearing. REQUEST DESCRIPTIVE BULLETIN.

PEERLESS PUMP

Peerless Vertical Turbine Pumps complement the extensive Peerless Centrifugal Pump line and are adaptable to the widest pumping conditions. Peerless' vertical type pump line includes turbine pumps, propeller and mixed flow pumps, Hi-Lift pumps and domestic water systems for deep or shallow wells. REQUEST BULLETIN.

### *PLAN WITH PEERLESS*

For all your pumping requirements, plan with Peerless. Peerless' comprehensive line of pumps includes Underwriters' approved vertical and horizontal Fire Pumps for plant fire protection, boiler feed and pipe line pumps and scores of vertical and horizontal types offering capacities from 10 to 220,000 g.p.m.

## PEERLESS PUMP DIVISION

**FOOD MACHINERY CORPORATION**

*Factories:* Los Angeles 31, Calif.; Quincy, Ill.; Indianapolis, Ind.

*District Offices:* Chicago 40, 4554 No. Broadway. Philadelphia Office: Suburban Square, Ardmore, Pa. Atlanta Office: Rutland Building, Decatur, Georgia; Dallas 1, Texas; Fresno, Calif.; Los Angeles 31, California.

▶▶▶ The position of chief engineer has been given to *Charles L. Edwards* by Nagle Pumps, Chicago Heights, Illinois, manufacturers of industrial pumps for abrasive and corrosive applications. Mr. Edwards previously was with the pump engineering department of the American Manganese Steel Division of American Brake Shoe Company.

◆

## PROMOTIONS ANNOUNCED BY LINK-BELT COMPANY

Promotions have been given by the Link-Belt Company, Chicago, to Columbus Basile and Leonard C. Heinlein.

Mr. Basile has been appointed superintendent of the company's Caldwell plant in Chicago. Before he was in the employ of the Link-Belt Pershing Road Chicago plant doing general shop work and later he became foreman of the machine shop of Link-Belt Ordnance Company. For the last three years he has been in charge of time study and methods at the company's plant in Philadelphia.

Mr. Heinlein has been appointed to the newly created position of assistant superintendent at the company's Ball & Roller Bearing Division plant in Indianapolis. He entered the employ of this plant in 1926, then known as the Dodge plant, and gained shop experience by working in the various shop departments. In the past few years, he has been engaged in the design and application of bearings to their manifold uses throughout industry.

◆

▶▶▶ Two new assignments to the staff of the Quartermaster Food and Container Institute for the Armed Forces, Chicago, have been announced. *Lt. Col. Manley C. Perry* is now Officer in Charge of the Rations Planning Office, and *Major Lawrence Dobson* is leader of ration development projects for the Army Ground Forces.

◆

▶▶▶ The B. F. Goodrich Company, Akron, Ohio, has appointed *Ernest Hookway* as operating manager of the recently created plastic materials sales division. Mr. Hookway has been with the company since 1936, and for the last two years has been a senior development man in the industrial products division.

◆

▶▶▶ Associated with the Kimberly-Clark Company (Neenah, Wis.) for fifteen years, *F. James Sensenbrenner* has assumed the duties of vice president of the American Paper Company, Milwaukee. Mr Sensenbrenner's background includes mill experience from raw materials to finished papers as well as sales work.

◆

▶▶▶ Recent visitors at the Brown Company (Berlin, N. H.) were *Jean* and *Roger de Montgolfier* of the Papeteries Montbelfier Freres of Paris, France. The two men came here to study the manufacture of specialty papers and to talk with members of the research department.

◆

▶▶▶ Two additions have been made to the staff of the New York office of The William Powell Company, Cincinnati. The new members are *S. H. Blackwood*, formerly with Midwest Piping & Supply Company, Inc., St. Louis, and *T. J. Malone*, formerly with Crane Company, Chicago.

◆

▶▶▶ The oldest employee present at the first annual meeting of the 25 Year Club of Fort Orange Paper Company (Castleton, N. J.) was *Enos Prins*, 70, who has fifty-seven years service with the company. The club has fifty-two members.

◆

▶▶▶ A farewell dinner was recently given by members of his department for *Robert Finster, Sr.*, upon his retirement as foreman of the converting department of the finishing division at Hammermill Paper Company (Erie, Pa.). He had been foreman in the finishing department since 1918.

◆

▶▶▶ United Paperboard Company, Inc., New York, has announced the appointment of *Frank L. Markle* as sales service manager of its Folding Carton Division. Before joiningUnited, Mr. Markle was associated for five years with the Sutherland Paper Company, and for eleven years with Eddy Paper Corporation.

◆

▶▶▶ The appointment of *Paul R. Hermann* as manager of the Chicago branch of E. C. Atkins and Company, Indianapolis, has been announced. Mr. Hermann started working for Atkins in 1926 and was transferred to the Pittsburgh territory in 1936, remaining in charge there until his new appointment.

◆

▶▶▶ The manager of the South Chicago branch of Bjorksten Research Laboratories, *Stuart O. Fiedler*, has accepted a position as manager of research of the Industrial Rayon Corporation, Cleveland. He will remain a director of the Bjorksten laboratories but is resigning as manager.

A Greeting Old--
To Friends Both Old and New

To all our friends we wish good health,
And happiness each day.
We hope that both success and wealth
Their labors will repay.

And so we send this greeting old--
But none the less sincere--
A Very Merry Christmas
And a Prosperous New Year.

Stebbins Engineering and Manufacturing Company
Watertown, New York

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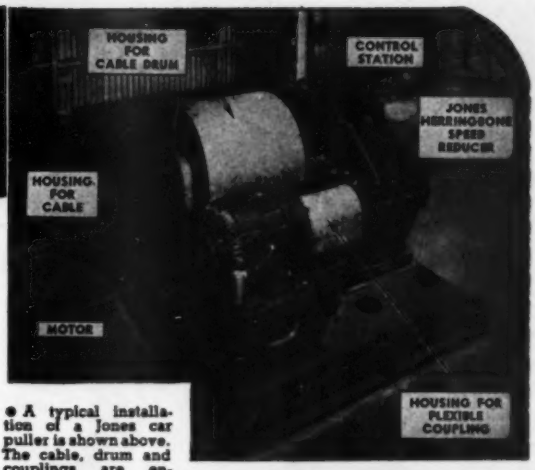
# JONES CAR PULLERS

YOU will be surprised how much time can be saved in the spotting and switching of cars by using a Jones car puller. These sturdy, compact units will speed up car handling to the point where they soon pay for themselves in the saving of time and labor.

These car pullers are built by Jones as complete units with motor included if desired, or with base to take standard motor, as supplied by the purchaser. The cable drum is driven by a Jones triple reduction Herringbone speed reducer and the control station may be located at a point to give the operator a clear view of the tracks and spotting positions.

Even in plants where comparatively few cars are handled it has been found that a Jones car puller more than pays its way. Prices and complete information will enable you to judge whether such an outfit might pay out in your plant. Write for complete information.

**W. A. JONES FOUNDRY & MACHINE CO.**
**4439 Roosevelt Road, Chicago, Illinois**




• A typical installation of a Jones car puller is shown above. The cable, drum and couplings are enclosed by sheet metal housings as an extra precaution in this installation to eliminate all hazard from moving parts.

• A complete Jones car puller unit. These outfits are for use with wire rope and are manufactured in a wide range of capacities to suit the number of cars to be handled in each plant.

**Jones** HERRINGBONE • WORM • SPUR • GEAR SPEED REDUCERS CUT AND MOLDED TOOTH GEARS • V BELT SHEAVES ANTI FRICTION PILLOW BLOCKS • PULLEYS FRICTION CLUTCHES • TRANSMISSION APPLIANCES

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***permanently end leaking and stuffing box trouble on all kinds of***

**Steam-Heated and Water-Cooled Rolls**
**No tight packing to act as brake on roll.**

Patented construction. Many in use 10 years or more. Specially compounded molded gasket lasts up to 15 months in severest service—easy, quick and inexpensive to replace. We also manufacture leak-proof SWING JOINTS and BALL JOINTS. Bulletin and price list upon request.

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Fig. 2228
200 lb. Bronze
Bonnet Gate

Fig. 123
"N-M-D"
Globe
(Non-
Metallic
Disc)

Fig. 1430
Iron Body Gate

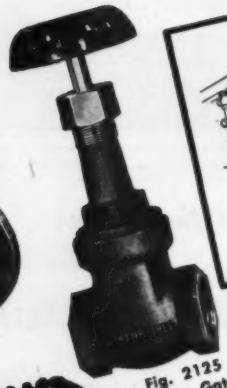
Fig. 2125
Bronze Gate

Fig. 1640
"King Clip" Gate

Fig. 16
"Renewo"
Globe

## *LUNKENHEIMER DISTRIBUTORS*

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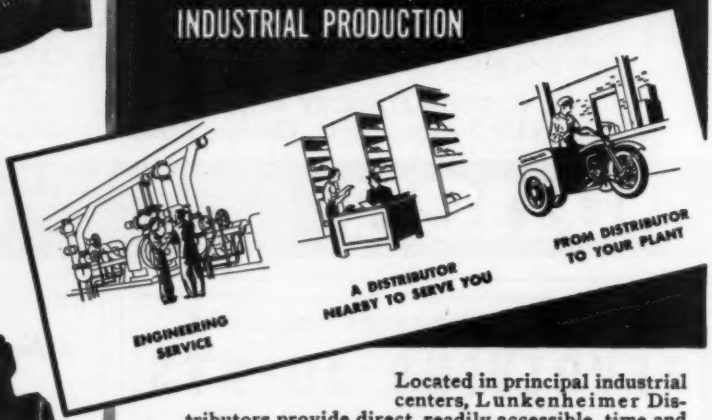


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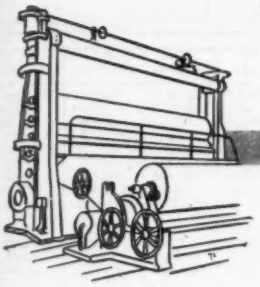
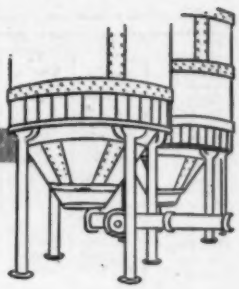
BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS



# Practical SHORTS



**Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.**

## Boiler Room Housekeeping

Housekeeping conditions in a boiler or engine room are the responsibility of the management and the boiler room operating personnel. Efficient and safe operation as well as personnel morale are contingent upon a clean and orderly boiler or engine room. In recent years, many plants have transformed their boiler rooms from hellholes into models of cleanliness and order. Adequate stock bins, pipe racks and convenient arrangement of tool boards help insure cleanliness and order.

The use of lighter and brighter colors in painting boiler and machinery spaces has helped immeasurably. When boiler exteriors, floors, walls, machinery and tools are painted in bright, gleaming colors, there is greater incentive among the operating personnel to keep the area clean. In fact, the easiest way to get a particularly messy area kept clean is to paint it white. When this is done the results are usually amazing. On considering a power plant re-paint job it is practical and desirable to follow a standard scheme for identification of piping systems. (Refer to American Standards Association Code A-13 on this subject.) This is done by painting live steam mains one color, water lines another color and fuel oil lines still another color, etc. This makes possible immediate identification of the contents of any line at a glance and prevents the opening of the wrong valves. —*G. E. Coons, District Engineer,* AMERICAN MUTUAL LIABILITY INSURANCE CO.

◆

## Special Consideration for Direct-Current Motors

*Location of Neutral on Reversing Motors*—Before brushes are sanded, they are set on mechanical neutral. Reversing motors, however, require further adjustments to neutral, or to the brush position at which the motor will run in either direction of rotation at the same speed and load with the same shunt-field current. Before attempting to set electrical neutral, it is necessary to have a good brush fit and smooth commutator surface. A reliable adjustment can be obtained by flashing the field. Connect a millivoltmeter between two adjacent brush studs. With the machine at rest, adjust the field-rheostats until the voltmeter give an appreciable reading when the field switch is suddenly closed. Shift the brushes until the reading is minimum. Then run the motor under full load in one direction at rated line voltages and rated top speed, noting field-current value. Reverse the rotation and repeat the procedure holding the same field current. If the speeds are not the same, further shifting of brushes will be necessary. The proper brush position is ascertained by trial and adjustment.

*Commutation on Variable-Speed Motors*—For a variable-speed motor, commutating field strength must be adjusted to give satisfactory commutation over the entire speed range. The correct procedure to be followed on a reversing motor is first to set the brushes on electrical neutral, and then proceed with commutation adjustments. A variable-speed motor will be found to have a weaker commutating field at the base speed than it has at the top speed Normally, since greater difficulty will be experienced in obtaining satisfactory commutation at top speed, observation should be started at that speed.—Preventive Maintenance of Electric Motors and Generators (TM55-405) WAR DEPARTMENT TECHNICAL MANUAL.

◆

## Galvanized Sheet Gauge

| Number of Gauge | Weight per Square Foot in Ounces | Weight per Square Foot in Pounds |
|---|---|---|
| 8 | 112.5 | 7.031 |
| 9 | 102.5 | 6.406 |
| 10 | 92.5 | 5.781 |
| 11 | 82.5 | 5.156 |
| 12 | 72.5 | 4.531 |
| 13 | 62.5 | 3.906 |
| 14 | 52.5 | 3.281 |
| 15 | 47.5 | 2.969 |
| 16 | 42.5 | 2.656 |
| 17 | 38.5 | 2.406 |
| 18 | 34.5 | 2.156 |
| 19 | 30.5 | 1.906 |
| 20 | 26.5 | 1.656 |
| 21 | 24.5 | 1.531 |
| 22 | 22.5 | 1.406 |
| 23 | 20.5 | 1.281 |
| 24 | 18.5 | 1.156 |
| 25 | 16.5 | 1.031 |
| 26 | 14.5 | .906 |
| 27 | 13.5 | .844 |
| 28 | 12.5 | .781 |
| 29 | 11.5 | .719 |
| 30 | 10.5 | .656 |
| 31 | 9.5 | .594 |
| 32 | 9.0 | .563 |
| 33 | 8.5 | .531 |
| 34 | 8.0 | .500 |

—CARNEGIE ILLINOIS STEEL CORP.

## Proper Care of Hand Saws, Tools and Files

Moisture against a steel face, unless that face is well protected, means almost immediate rust. In order to keep a saw blade in the most perfect working condition, it must be entirely smooth on both sides. Rust means pitting and therefore, a rough surface. When you finish using a saw, rub it down with light oil. In case the saw is slightly rusted, rub the blade down first with fine emery cloth and then apply the oil.

Another important thing is the way edge tools are put away. Whether a saw is placed in a tool box or on a shelf, or hung from a nail or hook, always take care that the tooth edge is placed so that no other tools will knock against the teeth and injure them.

Tools should always be placed with the cutting edges away from the person using them. Never hang a saw from a bench where the teeth can scratch a leg or knee.

When you are through using a tool lay it down carefully. Do not drop it. A file, for instance, is an edge tool. Its teeth, to give the greatest efficiency, are very hard. When one carelessly throws a file across his bench, he is likely to break off the edges of several teeth. A good tool deserves good treatment and the more care you give it the better service it will give you.

Common sense will suggest many necessary rules for caring for your tools. Keep them in good working order, in a clean container or neatly arranged on hooks and keep them in a dry place.—*Disston Saw, Tool and File Manual,* HENRY DISSTON & SONS, INC.

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## Cleaning Commutator

A stable, copper oxide-carbon film on the cummutator is desirable. Such a film may vary in color all the way from copper to straw, from chocolate to black. Fumes and oil vapors tend to smudge, gum, and discolor the commutator. Oil and grease will create a mottled appearance on the surface film. Dirt and particles of carbon and copper may accumulate and damage the commutator surface. When operating conditions tend to have such effects, regular cleaning is desirable. To clean the commutator, proceed as follows:

(a) Cut a stick of wood to a length of about 6 inches and trim it to the same width as the commutator and to a thickness of about ¼ inch.

## Interconversion Tables for Units of Volume and Weight

| TO CONVERT FROM | MULTIPLY BY — To Cu. In. | To Cu. Ft. | To Cu. Yd. | To Fl. Oz. | To Pint | To Quart | To Gallon | To Grain | To Oz. Troy | To Lb. Troy | To Oz. Av. | To Lb. Av. | To CC. or G. | To Liter Or Kg. | To Cu. M. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cu. In. | 1.00000 | .0$_3$5787 | .0$_4$2143 | .554112 | .034632 | .017316 | .004329 | 252.891 | .526857 | .043905 | .578037 | .036127 | 16.3871 | .016387 | .0$_6$1639 |
| Cu. Ft. | 1728.00 | 1.00000 | .037037 | 957.505 | 59.8442 | 29.9221 | 7.48052 | 436996 | 910.408 | 75.8674 | 998.848 | 62.4280 | 28316.9 | 28.3169 | .028317 |
| Cu. Yd. | 46656.0 | 27.0000 | 1.00000 | 25852.6 | 1615.79 | 807.896 | 201.974 | 11799$_0$ | 24581.0 | 2048.42 | 26968.9 | 1685.56 | 764556 | 764.556 | .764556 |
| Fl. Oz. | 1.80469 | .001044 | .0$_3$3868 | 1.00000 | .062500 | .031250 | .007813 | 456.390 | .950813 | .079234 | 1.04318 | .065199 | 29.5736 | .029573 | .0$_4$2957 |
| Pint | 28.8750 | .016710 | .0$_4$6189 | 16.0000 | 1.00000 | .500000 | .125000 | 7302.23 | 15.2130 | 1.26775 | 16.6908 | 1.04318 | 473.177 | .473177 | .0$_3$4732 |
| Quart | 57.7500 | .033420 | .001238 | 32.0000 | 2.00000 | 1.00000 | .250000 | 1460.45 | 30.4260 | 2.53550 | 33.3816 | 2.08635 | 946.354 | .946354 | .0$_3$9463 |
| Gallon | 231.000 | .133681 | .004951 | 128.000 | 8.00000 | 4.00000 | 1.00000 | 58417.9 | 121.704 | 10.1420 | 133.527 | 8.34541 | 3785.42 | 3.78542 | .003785 |
| Grain | .003954 | .0$_4$2288 | .0$_6$8475 | .002191 | .0$_3$1369 | .0$_3$6850 | .0$_4$1712 | 1.00000 | .002083 | .0$_4$1736 | .002286 | .0$_4$1428 | .064799 | .0$_4$6479 | .0$_6$6479 |
| Oz. Troy | 1.89805 | .001098 | .0$_4$4068 | 1.05173 | .065733 | .032867 | .008217 | 480.000 | 1.00000 | .083333 | 1.09714 | .068571 | 31.1035 | .031104 | .0$_3$3110 |
| Lb. Troy | 22.7766 | .013181 | .0$_3$4882 | 12.6208 | .788800 | .394400 | .098600 | 5760.00 | 12.0000 | 1.00000 | 13.1657 | .822857 | 373.242 | .373242 | .0$_3$3732 |
| Oz. Av. | 1.72999 | .001001 | .0$_3$3708 | .958608 | .059913 | .029957 | .007489 | 437.500 | .911457 | .075955 | 1.00000 | .062500 | 28.3495 | .028350 | .0$_4$2835 |
| Lb. Av. | 27.6799 | .016018 | .0$_2$5933 | 15.3378 | .958611 | .479306 | .119826 | 7000.00 | 14.5833 | 1.21528 | 16.0000 | 1.00000 | 453.593 | .453593 | .0$_3$4536 |
| CC or Gram | .061024 | .0$_3$531 | .0$_4$1308 | .033814 | .002113 | .001057 | .0$_3$2642 | 15.4323 | .032151 | .002679 | .035274 | .002205 | 1.00000 | .001000 | .000001 |
| Liter or Kg. | 61.0237 | .035315 | .001308 | 33.8140 | 2.11337 | 1.05669 | .264172 | 15432.3 | 32.1507 | 2.67923 | 35.2739 | 2.20462 | 1000.00 | 1.00000 | .001000 |
| Cu. M. | 61023.7 | 35.3146 | 1.30795 | 33814.0 | 2113.37 | 1056.69 | 264.172 | 154320$_0$ | 32150.7 | 2679.23 | 35273.9 | 2204.62 | 1000000 | 1000.00 | 1.00000 |

NOTE:—The small subnumeral following a zero indicates that the zero is to be taken that number of times, thus .0$_4$1428 is equivalent to .0001428.

Values used in constructing table:

1 inch = 2.540001 cm.

1 cu. in. = 16.387083 cc. = 16.387083 g. $H_2O$ at 4°C.(39°F.)

1 lb. av. = 453.5926 g.

1 lb. av. = 27.679886 cu. in $H_2O$ at 4°C. (39°F.).

1 lb. av. = 7000 grains

1 gal. = 8.34541 lb.

1 gallon = 58417.87 grains.

231 cu. in. = 1 gal. = 3785.4162 g.

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(b) Fold a piece of dry canvas or other hard, non-linty material (or No. 00 sandpaper) over the end of the stick and fasten it securely. (Figure 1.)

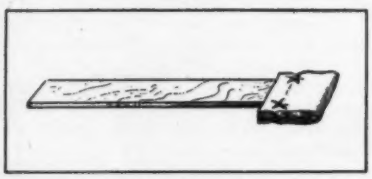

***Fig. 1—Device and cleaning a commutator-dry canvas fastened to a wooden stick***

(c) With the armature rotating, hold the stick squarely against the commutator and press slightly for a few seconds. (Figure2.)

(d) If the commutator is not clean after this procedure, repeat procedure one or more times.

(e) Wipe the dust off with canvas, or if necessary, blow dust out with moisture-free compressed air.

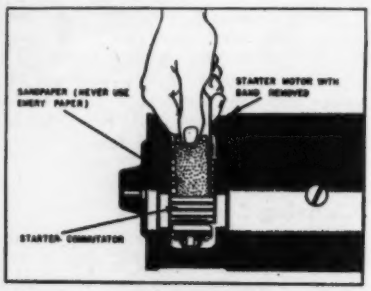


***Fig. 2—Cleaning a starter-motor commutator***

(f) If, after cleaning, the commutator does not have a polished appearance, the machine should be run with a light load for several hours in order to establish a high and uniform polish.

*Warning:* Never use emery paper, a lubricant, or gasoline or other inflammable fluid to clean or polish the commutator.—*Preventive Maintenance of Electric Motors and Generators, TM55-405,* WAR DEPARTMENT TECHNICAL MANUAL.

## Inspection of Commutators

When good commutation cannot be obtained, or when scheduled inspection is called for, check as follows:

(a) Inspect all connections and make sure that none is loose

(b) Check the brush spacing and alignment. In general, the more accurate the brush spacing, the better the commutation

(c) Inspect the adjustment of brushes in the holders

(d) Inspect the brush contact surfaces for burning or roughness

(e) Check brush-spring pressure and brush fit

(f) Check the neutral. Very often a slight shift of the brushes away from neutral is advantageous. (Such shifting should be considered in relation to regulation of speed of motors and division of load on generators.)

(g) Make sure that no part of the commutating field is reversed, and that none of the main windings is reversed.

(h) Check the centering of the commutating poles between the main poles; also check the main- and commutating-pole air gap.

(i) Wipe the commutator clean with dry canvas so that it may readily be inspected, and rotate the armature by hand in order to inspect all bars.

(1) The surface should be smooth and have a high polish.

(2) Eccentricity of the commutator, high and low bars, high mica, pitted mica (usually caused by the presence of oil, grease, dirt, or minute particles of carbon and copper), and grooves in the commutator (usually caused by incorrect staggering of brushes or by use of brushes having too high an abrasive quality) are conditions that must be corrected by turning the commutator and removing the cause.

(3) The commutator should also be examined for indications of excessive heat, such as solder flakes, burned bars, and burned insulation at the point where the armature windings are soldered to the commutator. Here, too, corrective action must be related to both cause and effect.—Preventive Maintenance of Electric Motors and Generators, TM55-405, WAR DEPARTMENT TECHNICAL MANUAL.

## To Color Glycerine

For various purposes in plant and laboratory, it is frequently desired to color glycerine. The following colors, in quantities varying from one to two ounces per gallon of glycerine, depending upon the depth desired, may be used:

Yellow—Auromine
Scarlet—Pylam Scarlet No. 1323
Green—Malachite Green
Blue—Methylene Blue
Orange—Chrysoidine
Violet—Methyl Violet
Black—Pylam Basic Black
Brown—Bismark Brown

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## Right and Wrong Way to Measure Diameter of Wire Rope

The diameter of a wire rope is that of a circle enclosing the rope. Fig. 1 shows how to get the correct measurement; Fig. 2, the wrong way of doing it. The correct

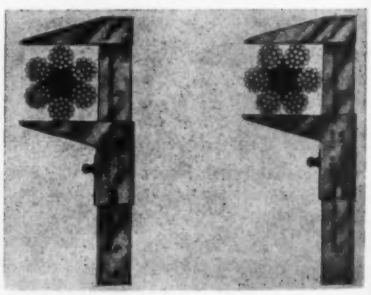

***Figure 1*** ***Figure 2***

measurement as indicated on the caliper of Fig. 1 is 1½ in.; while the caliper of Fig. 2, improperly placed on the same rope gives an incorrect reading of 1⅜ in.—JOHN A. ROEBLING'S SONS CO.

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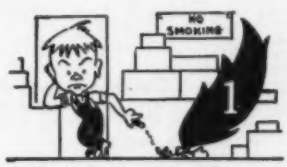
## Oilstone Care

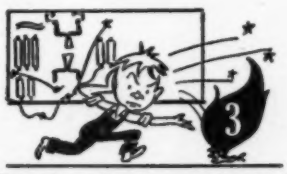
An oilstone tends to dry out and become hard if exposed to the air for long periods of time. It should be kept clean and moistened with a few drops of oil when not in use. *Grit and Grinds,* October, 1947 (Vol. 38, No. 10).

# 13 Ways NOT to Burn your Factory




Don't smoke in combustible areas.

Don't grind where explosive or flammable materials are stored or used.




Keep electrical equipment and wiring in good repair.

Keep flammable liquids in safety cans and away from ignition sources.

A clean factory seldom burns.

Sprinklers should not be obstructed by stock.

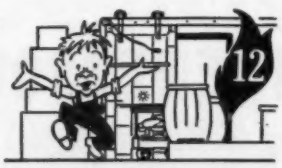
Inspect fire appliances regularly and keep them easily available.

Know what YOU should do when the fire alarm sounds.

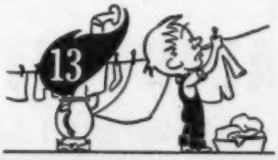
Be proud of your plant: report obvious fire hazards.

Check for fire hazards BEFORE you cut or weld.

Don't use oil lanterns or torches around flammable liquids or combustibles.




Don't block fire doors.




Check heating devices for defects and combustibles nearby.

National Fire Protection Association

# Convention Papers . . . Abridged

Abridgments in this section are from papers presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry** held in New York City, February 24-27, 1947

## A Study of Certain Factors Affecting the Filtration of Smoke by Fibrous Materials*

**JULES J. PEROT, JR., Group Leader**
**Research Laboratory, The Flintkote Co.**

Very little has been published on the subject of air filters. This is to be expected, in view of the fact that all development has been either by military or commercial manufacturers of filters. A few general articles of a nontechnical nature have appeared (Davis, R. W. Gorman, *Chemistry & Industry* 17:334-336, 1939); (Prentiss, Augustin M., Chemicals in War. New York, McGraw-Hill Book Co., Inc., 1937. 739 p.); (Brown, Carlston E., *J. Ind. Hyg. Toxicol.* 19:95-107, 1937); (Mohler, H., *Protar* 7:89-92, 1941); (Labhardt, H., *Protar* 3:175-178, 189-194, 206-212, 1937).

The only technical publication available on this subject is that of Kaufmann (*Z. Ver. deut. Ing.* 80, no. 20:593-599, 1936). His investigations were made on pads of cotton, artificial fibers, and filter paper. Flue gases and quartz dust were used as aerosols. He stated that the efficiency of filtration increased with decreasing diameter of the fibrous material and with increasing particle size of the aerosol.

Gibbs (*J. Soc. Chem. Ind.* 41:189T-196, 1922), as well as Kaufmann, has suggested that electrostatic charging of the particles would increase the ease of filtration. In the case of an air filter any charges on the particles are probably due to collisions between particles and between particles and fiber surfaces.

The present investigation describes the effects on filtering efficiency of the papermaking variables such as beating, degree of wet pressing, use of fillers, sheet weight, sheet density, and sheet caliper. To facilitate the logical selection of a fibrous raw material for use as an air filter, the effects on filtering efficiency of fiber length, width, shape, and surface characteristics were examined.

(*) A portion of a thesis presented in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, May, 1943. This work was carried out under the direction of George R. Sears.

### TEST METHODS

#### Measurement of Filtering Efficiency with the Penetrometer

The instrument used in this investigation to measure the filtering efficiency of the various fibrous materials was a penetrometer similar to that developed by Hill (*J. Sci. Instruments* 14:296-303, 1937). A schematic diagram of the instrument is shown in Figure 1.

The operation of the penetrometer was as follows: Gas flowed to the burner B through valve $V_2$ at a rate measured by the flowmeter $F_1$. The equilibrium smoke concentration in the chamber S was determined by the rate of flow of gas to the burner and by the rate of removal of smoke through the rest of the apparatus. With stopcocks $C_1$ and $C_4$ open and $C_3$ and $C_2$ closed, the rate of flow of air through the system was adjusted by means of valve $V_1$ to a value of 42.5 liters per minute as measured by the flowmeter $F_2$. The electrostatic precipitator $E_1$ removed dust from the air as it was drawn from the room and through the apparatus. When the system had been washed out with this clean air, stopcock $C_3$ was opened and $C_4$ closed; the air thus passed through the specimen at D on its way to the absorption tube $T_1$. The absorption tube $T_2$ was identical with $T_1$, except that it was sealed. Light from the lamp L passed through both absorption tubes to the photocells. The difference in the pho-

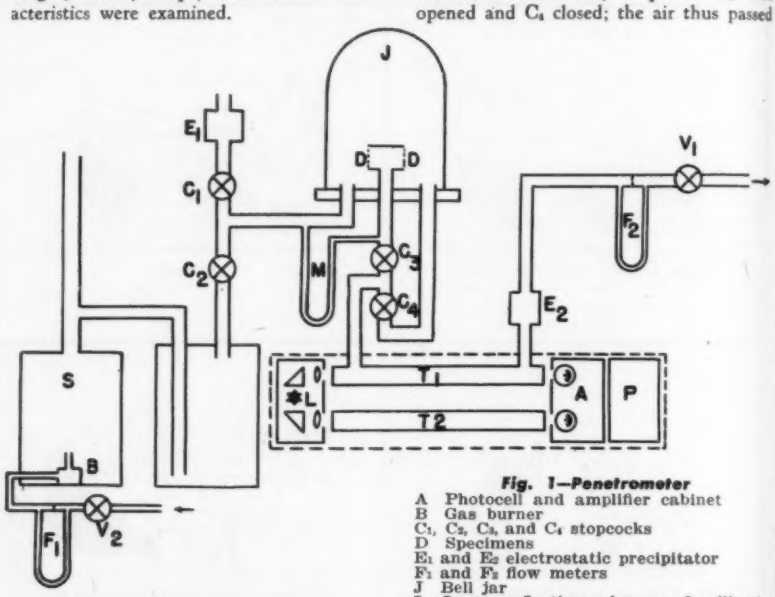
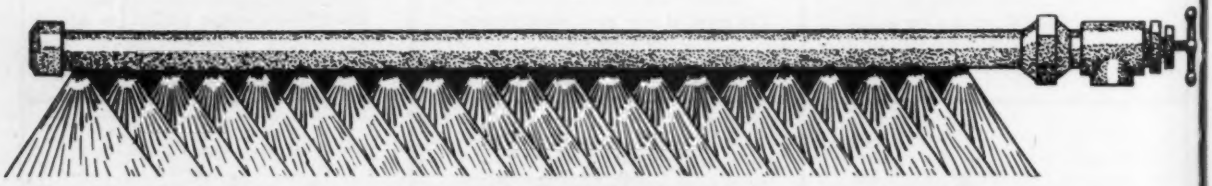



***Fig. 1—Penetrometer***

A Photocell and amplifier cabinet
B Gas burner
$C_1$, $C_2$, $C_3$, and $C_4$ stopcocks
D Specimens
$E_1$ and $E_2$ electrostatic precipitator
$F_1$ and $F_2$ flow meters
J Bell jar
L Lamp, reflecting prisms, and collimating lenses
M Manometer
P Power supply for amplifier
S Smoke chamber
$T_1$ Active absorption tube
$T_2$ Blank absorption tube
$V_1$ and $V_2$ valves



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to currents was amplified and read on a milliammeter which was part of the amplifier circuit. With clean air passing through the system, an adjustment was made to cause the meter to read zero. The pressure drop across the specimen was read from manometer M. Stopcock $C_1$ was opened, $C_2$ closed, $C_3$ opened, and $C_4$ closed, thus drawing smoke-ladened air from the chamber S through the system without passing it through the specimen. The amplifier was then adjusted to cause the meter to read 100 for this maximum smoke concentration in absorption tube T. Stopcock $C_2$ was opened and $C_4$ closed to pass the smoke through the specimen and a stop watch was started. Initially a large fraction of the smoke passed through the specimen but the particles removed from the air stream and deposited in the specimen improved the effectiveness of the filtering action by "plugging up" the sheet. Hence, the meter reading, called the penetration and expressed as a percentage of the full scale reading, decreased and the pressure drop across the specimen, called the resistance, increased as the flow continued. Readings of resistance and penetration were taken at intervals until the resistance rose beyond the range of the manometerm—i.e., about 55 mm. of water.

The initial resistance was taken as the pressure drop across the specimen when clean air was passing through the system. The specimen D consisted of two circular disks cut from the paper with a die of 4-inch diameter. The unfiltered smoke concentration was maintained at approximately 23 mg. per cubic meter and was measured from time to time by means of the electrostatic precipitator $E_2$. The meter reading was not a linear function of the smoke concentration in the absorption tube $T_1$ but it was arbitrarily called penetration.

For the purpose of the following presentation, the lower the resistance at the indicated penetration, the greater is the efficiency of the specimen as a filter.

**Preparation of Handsheets**

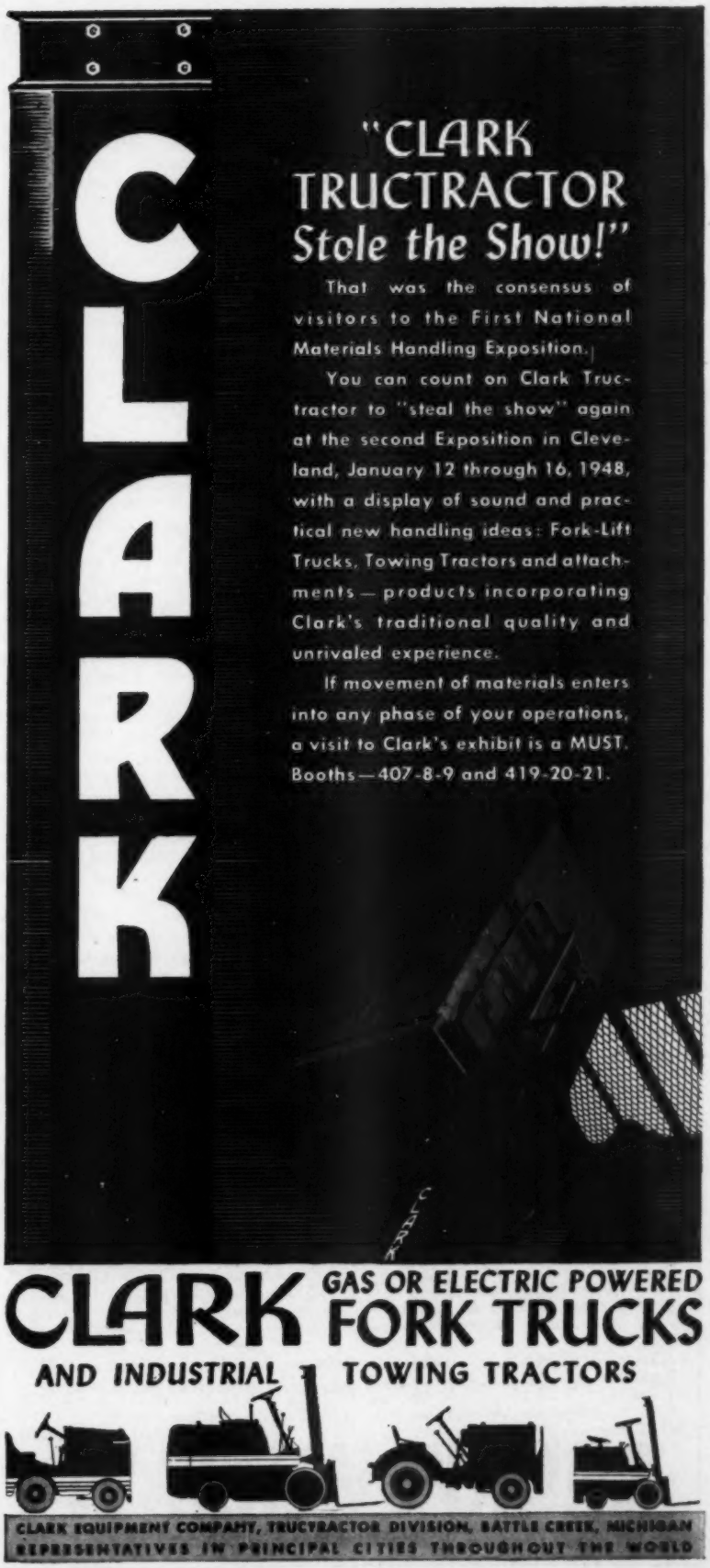
Handsheets were formed on the British sheet mold according to TAPPI Standard T 205 m-36. The polished plate which is ordinarily placed on the sheets during drying was not used. Sheets were air dried and conditioned for 24 hours prior to test at 73 Fahr. and 50 per cent relative humidity.

**Preparation of Alcohol-Replaced Sheets**

Alcohol-replaced sheets were formed in the same manner as the regular sheets, with the following exception: Before couching the wet sheet off the forming wire, a piece of fourdrinier wire was carefully laid over the sheet and about 250 ml. of denatured ethyl alcohol gently poured over the entire sheet surface. The fourdrinier wire was then removed and, after one minute, the excess alcohol was drained off. This method was found to duplicate the results obtained by forming the sheets in alcohol and possesses obvious advantages over the latter method.

**Preparation of Air-Formed Pads**

Air-formed pads were prepared by blowing dry disintegrated pulp (the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Gösta Hall disintegrator was used) onto a fourdrinier wire held in the lower section of a special test cell which could be connected to the penetrometer in place of the usual specimen at D in Figure 1. After deposition of the fibers as a loose pad in this lower part of the cell, the upper section which telescoped with the lower section was pressed down and bolted into place. The test specimen occupied a constant and reproducible volume.

**Preparation of Sheets Containing Filler**

Filled sheets were prepared with the Noble and Wood sheetmaking apparatus. This equipment was operated with a closed white water system, allowing a build-up of filler in the white water and improving retention.

**Measurement of Fiber Length and Width**

These measurements were made according to methods developed by Graff (*Pulp and paper microscopy*. 2d ed., Appleton, Wis., The Institute of Paper Chemistry, 1942. 193 p.). Briefly, this method was as follows: The fibers were dyed and slides containing about 25 fibers per slide were prepared. After the specimens were dried, a drop of calcium chloride solution was added to soften the fibers. By the use of a dissecting microscope, the fibers were aligned parallel to each other and covered with a cover glass. Actual measurements were carried out on the projected images of the fibers. About two hundred fibers were measured for each material tested.

**Comparison of Pulps**

When this work was begun, a number of commercially available pulps were made into test sheets, using equal weights of material and identical sheetmaking techniques. When these sheets were tested, pulps which formed sheets of low density were found to be more efficient filters than those which formed sheets of higher density. Such a comparison may give a measure of the immediate practical filtering efficiency of the pulps, but it does not give a true comparison of the inherent filtering ability. The work on sheet density and sheet weight has shown that materials should be compared on the basis of equal weights at equal densities.

Disregarding for the moment any possible effects of individual fiber characteristics other than length and width, Table 14 indicates that there is no correlation between average fiber length (either weighted or arithmetic average) and the resistance factor. Neither is there a correlation between average fiber area and the resistance factor. There is, however, a correlation between average fiber width (either weighted or arithmetic average) and the resistance factor. This correlation between weighted fiber width and the resistance factor is shown in Figure 7. These results are in agreement with the work of Kaufmann (*Z. Ver. deut. Ing.* 80, no. 20:593-599, 1936), who reported that a decrease in the diameter of the fibrous material caused an increase in the filtering efficiency.

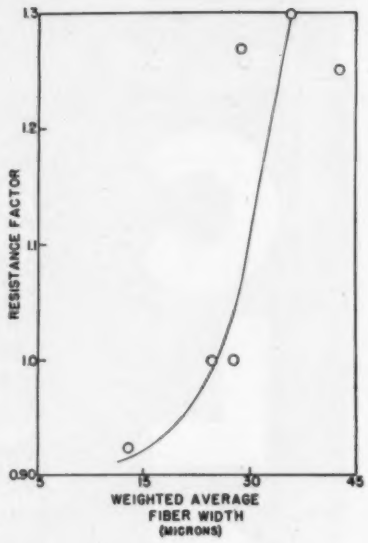


*Figure 7*

Thus, from a practical point of view, a fibrous material should have a small diameter to give a high filtering efficiency; it should also have a low bonding strength, so that sheets of low density may be formed by normal papermaking processes, for which the optimum sheet density seems to be about 0.20 g./cc.

To obtain fibers with very small diameters, it would be necessary to use materials other than those commonly employed in papermaking. For example, pineapple fibers are about 8 microns in diameter and those of sea grass are slightly smaller (Hill, A. S. G., *J. Sci. Instruments* 14:296-303, 1937). Pulps made from these materials would undoubtedly be expensive, but since relatively small amounts are required, the added expense might be justified.

To obtain the low sheet density necessary for maximum filtering efficiency, several devices might be employed in commercial practice. For commercial production, the filter sheets should be formed in the usual manner on conventional papermaking equipment. Further, pulps which are difficult to "hydrate" are required, such as those obtained by the alkaline treatment used in the manufacture of alpha pulp. Experiments dealing with the chemical processing of pulps should be very fruitful.

It is a well-known fact (Bletzinger, John C., *Ind. Eng. Chem.* 35:474-480, 1943) that the bonding strength of cellulose fibers is reduced when their free hydroxyl groups are partially replaced by other groups, such as acetyl groups. A partially acetylated pulp might be very helpful in obtaining optimum sheet density. The sheet density also might be reduced by passing the wet sheet through an alcoholic bath after it had left the wet presses. Such an operation would require the design and construction of special equipment which would permit the use of a volatile liquid such as alcohol.

A logical basis for the comparison of filtering efficiencies of different materials is the use of equal weights of materials at the same sheet density, rather than the use of sheets of equal weight formed under identical conditions.

A study of the effect of fillers on filtering efficiency indicates that certain fillers (namely, asbestos and Celite) produce an increase in filtering efficiency when added to the sheet in low concentrations.

**Table 14—Comparison of Pulps**

| Pulp | Resistance Factor | Arithmetic Average Fiber Width, mm. | Weighted Average Fiber Width, mm. | Arithmetic Average Fiber Length, mm. | Weighted Average Fiber Length, mm. | Average Fiber Area, sq. mm. |
|---|---|---|---|---|---|---|
| Pine, kraft | 1.30 | 0.034 | 0.036 | 1.17 | 1.74 | 0.0413 |
| Spruce, kraft | 1.27 | 0.026 | 0.029 | 0.81 | 1.17 | 0.0231 |
| Spruce, sulphite | 1.25 | 0.030 | 0.043 | 0.60 | 2.05 | 0.0230 |
| Cotton linters | 1.00 | 0.027 | 0.028 | 1.25 | 1.61 | 0.034 |
| Spruce, alpha | 1.00 | 0.024 | 0.025 | 0.75 | 1.16 | 0.0185 |
| New Zealand flax, soda | 0.92 | 0.013 | 0.013 | 1.20 | 1.63 | 0.0158 |

## Comparative Studies in the Chlorination of Wood Pulp

**OLIVER S. SPROUT, JR.[1] and THOMAS W. TOOVEY[2]**

It is generally understood that the chlorination of woodpulp refers to those processes whereby woodpulp is subjected to treatment with elemental chlorine in the form of a liquid, a gas, or a dispersion or solution in water. Such chlorination processes are commonly employed as unit operations in the multistage production of bleached pulps.

The object of these studies was to explore the practical implications of the reactions occurring during the chlorination of woodpulp. The reactions were considered with reference to the integration of the chlorination stage in the bleaching process.

The fibrous raw materials employed in these bleaching studies included two representative commercial pulps; one a sulphate pulp having a chlorine demand of 8.70% chlorine, the other, a sulphite pulp having a chlorine demand of 6.17% chlorine.

(1) Whitemarsh Research Laboratories. (2) Pulp and Paper Technologist, Pennsylvania Salt Mfg. Co.

Semibleached sulphate pulps were prepared by methods which differed from each other with respect to the distribution of chlorine in the chlorination stages, the manner of effecting the chlorination, and the sequence of the chlorination and alkaline extraction stages. Fully bleached pulps were produced, when needed, by further processing which consisted of two successive hypochlorite stages and a final acidification stage using sulphur dioxide in all cases. The following conditions were common to all procedures where the stages noted were applied:

1. Chlorination Stages; 3% consistency, room temperature, (25 C.)

2. 1st Alkaline Stage; 10% consistency, 60 C., 1 hour, 2% NaOH.

3. 2nd Alkaline Stage; 10% consistency, 40 C., 1 hour, 1% NaOH.

4. 1st Hypochlorite Stage; 10% consistency, room temperature, (25 C.). Calcium hypochlorite added equal to 75% of the chlorine demand of the pulp entering this stage, available chlorine allowed to exhaust. Where necessary NaOH was added for pH control.

5. 2nd Hypochlorite Stage; 5% consistency, 40 C., calcium hypochlorite added equal to 100% of the chlorine demand of the pulp entering this stage, available chlorine allowed to exhaust. Where necessary NaOH was added for pH control.

6. Acidification Stage; 3% consistency, room temperature (25 C.) 1 hour, 0.50 to 0.58% $SO_2$ added.

Bleached sulphite pulps were also prepared to explore chlorination in a manner similar to that utilized in the sulphate bleaching studies. However, sulphite bleaching was not developed as extensively as sulphate bleaching in view of the inherent ease with which sulphite pulps may be bleached as compared to the more complex methods required by sulphate pulps. The conditions outlined below were common to all sulphite pulp bleaches which included these stages:

1. Chlorination Stage; 3% consistency, room temperature.

2. Alkaline Stage; 3% consistency, 16 hours, room temperature, 0.50% NaOH.

3. Hypochlorite Stage; 5% consistency, 40 C., 6 hours, calcium hypochlorite added equal to 100% of the chlorine demand of the pulp entering this stage.

All pulps were water-washed between each stage.

The chlorine requirement of the pulps before and after each stage in the several bleaching procedures was determined by the TAPPI Standard Method T 214 m-42, Permanganate Number of Pulp, which expresses results as "percentage bleach consumption as chlorine." The value thus obtained was termed the "chlorine demand" of the pulp and indicated the percentage of available chlorine on a pulp basis in the form of chlorine or hypochlorite, required by the pulp.

The cuprammonium viscosity of bleached and semibleached pulps was determined as required, using the procedure of the TAPPI Standard Method T 206 m-44, for the preparation of the cuprammonium dispersed pulps. The viscosity measurement was carried out utilizing the Hoeppler Viscosimeter, which Hisey and Brandon have found to be very satisfactory for this purpose.

The brightness values for the bleached pulps were measured with the Schoenberg-Roth color instrument calibrated against magnesia as 100%.

The beating characteristics of the bleached pulps were determined by TAPPI Standard Method T 200 m-45, Laboratory Processing of Pulp (Beater Method). Freeness during beating was followed by the use of the Williams Model B freeness tester. Sheets of standard TAPPI basis weight (60 gram per sq. m.) were prepared and conditioned by standard methods and the strength properties of the sheets evaluated by TAPPI Standard Methods T 403 m-45, Bursting Strength of Paper, T 414 m-42, Internal Tearing Resistance of Paper, and T 423 m-45, Folding Endurance of Paper, using the M.I.T. type of apparatus.

The optimum amount of chlorine to be introduced in the chlorination stage was ascertained by adding 20, 40, 60, and 80% of the chlorine demand of the raw pulp to portions of sulphate pulp and allowing the chlorine to exhaust, so that the minimum amount of chlorine necessary for chlorination as well as for full bleaching might be established. The chlorination was successively followed by alkaline extraction, two hypochlorite stages, and acidification with $SO_2$.

Sulphite pulp was treated in a manner similar to the sulphate pulp with 20, 40, 60, and 80% of the chlorine demand added in the chlorination stage. The chlorination stage was followed by an alkaline extraction and a single hypochlorite stage.

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It was apparent that, when considering the chlorination stage as an integral portion of a bleaching process, there was an optimum degree to which chlorination might be extended, but not surpassed.

Comparison of the chlorination of sulphate and sulphite pulps with respect to the quantities of bleachable materials removed by given proportions of the chlorine demand showed that chlorination with 60% of the chlorine demand had removed 79.8% of the bleachable material in the case of sulphite pulp but only 59.5% of the bleachable material of the sulphate pulp. It was considered that the lower removal of the bleachable material in the case of the sulphate pulp might have resulted from the physical distribution of the lignin in the fiber as described by the Institute of Paper Chemistry and by Lewis. This suggested that if the pulp were subjected to two chlorinations with an intermediate wash to remove soluble products, a higher chlorination efficiency might be obtained.

Sulphate pulp was accordingly chlorinated in two stages utilizing a total of 60% of the chlorine demand (5.22% $Cl_2$) as an equitable amount for initial exploration of this type of procedure. In order that the optimum distribution of chlorine between the two stages might be established, portions of pulp were treated in the first chlorination, with 20, 40, 60 and 80% of the total chlorine provided, the balance of the chlorine being added in the second chlorination stage. The pulp was given the standard alkali extraction after the second chlorination. The data for these pulps showed that, as increasing amounts of chlorine were added in the first stage, increased removal of bleachable material was accomplished in the first stage and further purification was obtained through the second chlorination. However, the differences between the several pulps diminished after the second chlorination and all the pulps were identical after the caustic extraction.

The data also showed that, insofar as chlorination was concerned, introduction of 60% of the chlorine demand in two stages with intermediate washing was more effective than the addition of a like amount of chlorine in a single stage. Thus pulp from the single-stage chlorination possessed a chlorine demand of 3.52% chlorine while pulps from the two-stage chlorinations had chlorine demands of 2.10 to 2.68% chlorine, depending on the proportioning of the chlorine between the stages. But, after alkaline treatment, pulps from the single- and two-stage chlorinations approached each other and possessed chlorine demands of 1.97% chlorine and 1.76 chlorine respectively.

The two-stage chlorination procedure was modified by the insertion of an alkaline extraction stage between, rather than after, the two chlorination stages. It was expected that the materials rendered potentially alkali soluble by the first chlorination might be removed to allow the second chlorination to function more thoroughly.

Sulphate pulps were chlorinated as before using a total of 60% of the chlorine demand (5.22% chlorine) in the two stages with the introduction of 20, 40, 60 and 80% of this total in the first stage and the balance in the second stage. The pulp was treated with the standard alkaline extraction procedure between the two chlorinations. Data for these pulps showed increasing removal of bleachable materials in the first chlorination stage with the increase in the quantities of chlorine added. Further purification was accomplished by the alkali stage as well as by the second chlorination stage. The placement of the alkali stage between rather than after the two chlorination stages produced pulps of lower chlorine demand.

The point of optimum chlorination represented an addition in the first chlorination stage of 66.6% of the total chlorine added. The optimum for the first chlorination was accordingly equivalent to 40% of the chlorine demand of the raw pulp, thus substantiating the value determined in the studies of the single-stage chlorination bleaching. This optimum was also apparently valid for a two-stage chlorination with an intermediate alkali extraction.

The slow absorption of chlorine after the alkali stage suggested that the reaction occurring was one of oxidation rather than chlorination, and that the alkali stage might have removed materials capable of being chlorinated. The concept of an oxidation rather than a chlorination reaction was supported by the viscosity values for the semibleached pulps, for as the amounts of chlorine introduced in the second chlorination stage decreased, and thus decreased the opportunities for oxidative reaction, the viscosity values for the pulps showed a general increase and indicated a decrease in pulp degradation.

The possibility that oxidation occurred in the second chlorination of the chlorination-alkali-chlorination process was further investigated by substituting hypochlorite for the second chlorination to effect a chlorination-alkali-hypochlorite procedure.

The chlorine demand of the semibleached pulps indicated that chlorine might be substituted by hypochlorite insofar as the reactions removing bleachable materials were concerned under the conditions practiced.

It was conceived that the chlorination of raw pulp might be advantageously initiated by the use of incompletely exhausted chlorine-containing liquors recoverable from a subsequent chlorination stage. The feasibility of the proposed method was first explored by returning liquors from an incompletely exhausted chlorination to a "threshold" stage without any other steps intervening between the chlorinations.

## GRADES OF PAPER AND PAPERBOARD AFFECTED BY TARIFF REDUCTIONS AT GENEVA

| Grade | Rate Under Act of 1930 | Rate as Fixed by Later Trade Agreements | Rate Fixed by 1947 Geneva Agreements |
|---|---|---|---|
| **PARAGRAPH 1401** | | | |
| Uncoated papers commonly or commercially known as book paper and all uncoated printing papers not specially provided for, not including cover paper | ¼c per lb. and 10% | 1/5c per lb. and 5% | 1/5c per lb. and 5% (Bound at present rate) |
| **PARAGRAPH 1402** | | | |
| Pulpboard in rolls for use in the manufacture of Wallboard | 10% | 5% | 5% (Bound at present rate ) |
| Leather board or compress leather | 10% | .... | 10% (Bound at present rate) |
| Sheathing paper, roofing paper, deadening felt, sheathing felt, roofing felt, or felt roofing whether or not saturated or coated | 10% | 10% (Bound) | 5% |
| **PARAGRAPH 1403** | | | |
| Manufactures of pulp not specially provided for | 30% | .... | 15% |
| **PARAGRAPH 1404** | | | |
| Papers commonly or commercially known as tissue paper weighing not over 6 lb. per ream 20x30—480 | 6c per lb. and 20% | 3c per lb. and 10% | 3c per lb. and 10% |
| weighing 6-10 lb. | 5c per lb. and 15% | 2½c per lb. and 7½% | 2½c per lb. and 7½% |
| Stereotype paper under 6 lb. per ream valued at 15c per lb. or over | 6c per lb. and 20% | 4c per lb. and 15% | 3c per lb. and 10% |
| Stereotype paper 6-10 lb. per ream valued at 15c per lb. or over | 5c per lb. and 15% | 4c per lb. and 10% | 2½c per lb. and 7½% |
| Condenser paper under 6 lb. per ream valued at 15c per lb. or over | 5c per lb. and 15% | .... | 3c per lb. and 10% |
| Condenser paper 6-10 lb. per ream valued at 15c per lb. or over | 5c per lb. and 15% | .... | 2½c per lb. and 7½% |
| Carbon paper under 6 lb. per ream valued at 15c per lb. or over | 6c per lb. and 20% | 4c per lb. and 15% | 3c per lb. and 10% |
| Carbon paper 6-10 lb. per ream valued at 15c per lb. or over | 5c per lb. and 15% | 4c per lb. and 10% | 2½c per lb. and 7½% |
| Pottery paper under 6 lb. per ream valued at 15c per lb. or over | 6c per lb. and 20% | 4c per lb. and 15% | 3c per lb. and 10% |
| Pottery paper 6-10 lb. per ream valued at 15c per lb. or over | 5c per lb. and 15% | 4c per lb. and 10% | 2½c per lb. and 7½% |
| India and Bible paper under 6 lb. per ream valued at 15c per lb. or over | 6c per lb. and 20% | .... | 3c per lb. and 10% |
| India and Bible paper 6-10 lb. per ream valued at 15c per lb. or over | 5c per lb. and 15% | .... | 2½c per lb. and 7½% |
| India and Bible paper 10-20½ lb. per ream | 4c per lb. and 15% | 2c per lb. and 10% | 2c per lb. and 5% |
| Crepe paper valued at not more than 12½c per lb. | 6c per lb. and 15% | 3c per lb. and 7½% | 1½c per lb. and 3¾% |
| Valued at more than 12½c per lb. | 6c per lb. and 15% | .... | 3c per lb. and 7½% |
| Paper wadding and pulp wadding and manufactures of such wadding | 6c per lb. and 15% | .... | 3c per lb. and 7½% |

## GRADES OF PAPER AND PAPERBOARD AFFECTED BY TARIFF REDUCTIONS AT GENEVA

| Grade | Rate Under Act of 1930 | Rate as Fixed by Later Trade Agreements | Rate Fixed by 1947 Geneva Agreements |
|---|---|---|---|
| **PARAGRAPH 1405** | | | |
| Paper with coated surface or surfaces not specially provided for | 5c per lb. and 15% | .... | 2½c per lb. and 7½% |
| Fancy coated papers with metal coating | 4½c per lb. and 20% | .... | 4½c per lb. and 10% |
| Simplex Decalcomania paper not printed | 5c per lb. and 10% | 2½c per lb. and 10% | 1¼c per lb. and 5% |
| Papers with paraffine or wax coated surface or surfaces | 3c per lb. and 15% | .... | 1½c per lb. and 10% |
| Vegetable Parchment paper | 3c per lb. and 15% | 2c per lb. and 10% | 1c per lb. and 5% |
| Plain Basic Photo paper for blue or brown prints | 20% | .... | 10% |
| Unsensitized basic paper for photography | 5% | .... | 5% (Bound under present rate) |
| **PARAGRAPH 1407** | | | |
| Writing Paper | 3c per lb. and 15% | .... | 1½c per lb. and 7½% |
| Bond | 3c per lb. and 15% | .... | 1½c per lb. and 7½% |
| Ledger | 3c per lb. and 15% | .... | 1½c per lb. and 7½% |
| Manifold | 3c per lb. and 15% | .... | 1¼c per lb. and 7½% |
| Japan | 3c per lb. and 15% | .... | 1¼c per lb. and 7½% |
| Writing paper in sheets less than 110 square in. | 3c per lb. & 15% plus 5% cumulative duty | .... | 1½c per lb. and 10% |
| Writing and Similar papers, decorated, ruled, etc. | 3c per lb. and 25% | .... | 1½c per lb. and 12½% |
| Bristol Board valued at not over 15c per lb. | 3c per lb. and 15% | 2c per lb. and 10% | 1½c per lb. and 5% |
| Same valued at 15% per lb. or over | 3c per lb. and 15% | .... | 1½c per lb. and 7½% |
| Drawing paper valued at 40c per lb. or more | 3c per lb. and 15% | 2c per lb. and 10% | 1c per lb. and 5% |
| Handmade paper valued at not over 50c per lb., ruled | 3c per lb. and 25% | .... | 1½c per lb. and 12½% |
| not ruled | 3c per lb. and 15% | .... | 1¼c per lb. and 7½% |
| Same valued at 50c per lb. or over, ruled | 3c per lb. and 20% | 2c per lb. and 20% | 1½c per lb. and 12½% |
| not ruled | 3c per lb. and 20% | 2c per lb. and 10% | 1½c per lb. and 7½% |
| Papeteries | 40% | 30% | 15% |
| **PARAGRAPH 1409** | | | |
| Hanging Paper Raw stock | 10% | 7½% | 7½% (Bound at present rate) |
| Straw Board (9 point) | 30% | 15% | 7½% |
| Blotting Paper | 30% | 15% | 7½% |
| Filtering paper valued at less than 75c per lb. | 5c per lb. and 15% | .... | 5c per lb. and 15% (Bound at present rate) |
| Valued at 75c or more | 5c per lb. and 15% | 2½c per lb. and 7½% | 2½c per lb. and 7½% (Bound at present rate) |
| Cover Paper | 30% | .... | 15% |
| Stencil Paper unmounted | 30% | .... | 15% |
| **PARAGRAPH 1413** | | | |
| Paper and paperboard cut into shape | 30% | .... | 15% |
| Paper and paperboard vat-lined, etc. | 30% | $14.50 per ton, not less than 15% or more than 30% | $7.50 per ton, but not less than 7½% or more than 15% |
| Vat-lined pulp board, etc., for use in manufacture of wall board | 30% | 15% | 10% |
| Press Board | 30% | .... | 15% |
| Test or Container boards of bursting strength of over 60 lbs. | 20% | .... | 10% |
| **PARAGRAPH 1552** | | | |
| Cigarette Paper | 60% | 45% | 30% |
| **PARAGRAPH 1772** | | | |
| Standard Newsprint Paper | Free | Free (Bound) | Free (Bound on free list) |

(This table prepared by the Import Committee of the Paper Industry and published here with full permission.)

The point at which chlorination might best be terminated was determined by chlorinating sulphate pulp with 60 per cent of its chlorine demand (5.22% $Cl_2$) and following the rate of absorption of the chlorine by the pulp. Eighty-seven per cent of the chlorine was absorbed in five minutes.

Sulphate pulp was treated with 60% of the chlorine demand of the raw pulp and the reaction allowed to progress for five minutes. The pulp was then filtered off and the chlorine containing filtrate immediately transferred to a like portion of fresh pulp which was subsequently washed and chlorinated with the major quantity of fresh chlorine as before. No savings other than time were realized when employing this threshold chlorination.

In contrast to these findings were the results obtained when sulphite pulp was subjected to threshold chlorination in a manner similar to the procedure for sulphate pulp. However, the quantity of fresh chlorine added to the sulphite pulp was adjusted so that pulps of uniform chlorine demand would result from the standard chlorination or the threshold chlorination, thus permitting evaluation of chlorine savings.

The threshold chlorination of sulphite pulp was compared to a two-stage chlorination procedure which was identical except that the second chlorination was allowed to proceed to exhaustion. A slight advantage regarding the chlorine demand of the pulp after the chlorinations was indicated in favor of the two stage chlorination. This advantage was not held after the caustic stage, and the final pulp was not as bright as that from the threshold method, which also had a somewhat higher viscosity value.

Sulphate and sulphite pulps were treated with sufficient hydrochloric acid to reduce the *p*H of the system to *p*H 2 to 3 before chlorinating with 60% of the chlorine demand of the respective pulps.

In the case of the sulphite pulp, primary adjustment of *p*H was also realized by the addition of chlorinated liquors from a previous chlorination. Acidification to *p*H 2 to 3 prior to chlorination appeared to offer no improvement over straight chlorination with respect to the chlorine demand of the pulps after both the chlorination and alkaline extraction stages.


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It was observed that, where chlorinated liquors were employed as the acidifying agent prior to the chlorination, the chlorination was not as effective as in the cases where hydrochloric acid or no acidifying agent had been utilized. Chlorinated liquors were accordingly further chlorinated in the absence of pulp fibers. Sulphite pulp was chlorinated with 60% of its chlorine demand (3.70% chlorine) and allowed to exhaust, then filtered. The fiber free liquor was again treated with fresh chlorine and the residual chlorine determined at intervals. The acidification of a pulp slurry with chlorinated liquors prior to chlorination apparently established conditions leading to a competition for chlorine between the chlorinated liquors and fresh pulp with the resultant detriment to the substantial chlorination of the pulp.

Sulphate pulp bleaching by the process consisting of chlorination, alkali, chlorination, hypochlorite, hypochlorite, $SO_2$ stages still afforded unexplored opportunities for recycling chlorine-containing liquors by the summary termination of the second chlorination stage to avoid prolonged reaction times, attendant oxidative reactions, and loss of unconsumed chemical. The unexhausted chlorine from the second stage might be returned to pretreat the pulp prior to the main chlorination stage, resulting in a three-stage chlorination method.

One per cent chlorine was added in the first chlorination stage of a process including subsequent second chlorination stage, alkaline extraction, third chlorination, and alkaline extraction stages. The second chlorination, and the first alkali stages followed the usual routine. The third chlorination, however, was allowed to continue for only 5 minutes with varied quantities of chlorine introduced to determine the input required to permit recovery of 1.0% chlorine. The second alkaline stage was added to investigate the necessity for this stage. The resultant data indicated that the addition of 1.74% chlorine in the third chlorination stage was sufficient to yield after 5 minutes ca. 1.0% chlorine which could be returned to the first chlorination stage. Employment of a second caustic stage after the third chlorination stage did not appear to offer additional purification of the pulp commensurate with the expenditure of time and processing charges incurred.

The findings of the preliminary tests were applied in a series of full bleaches typified by three chlorination stages in which 1.0% chlorine was added in the first stage, the bulk of the chlorine (3.48% chlorine) was utilized in a normal manner in the second stage, and 1.74% chlorine was introduced in the third chlorination stage, which was interrupted after 5 minutes at the point of substantially complete chlorination with about 1.0% chlorine residual. Normal procedure consisted of successive chlorination, chlorination, alkaline extraction, chlorination, hypochlorite, hypochlorite, acidification stages. In the first run, fresh chlorine was added in the first chlorination stage since no liquors were available for recycling from the third chlorination stage. Liquors containing ca. 1.0% chlorine were withdrawn from the third chlorination stage of this bleach in the prescribed manner and used to treat another sample of raw pulp in its first chlorination stage. In addition, a further batch was prepared with fresh chlorine in the first chlorination stage, but with a second alkali stage after the third chlorination stage. Pulps with fresh chlorine or recycled chlorine liquor in the first chlorination stage appeared to be essentially similar, so that no deleterious action resulted from recycling the chlorine containing liquors. However, the addition of a second alkali stage appeared to furnish some benefits, notably regarding final brightness, in contradiction to all previous indications.

The beating characteristics and strength properties of sulphate pulps representing the various types of bleaching procedures were determined for the complete evaluation of the effects of bleaching.

Comparison of the freeness of the pulps under beating showed the pulp from the three-stage chlorination process to be a little more resistant to beating than the pulp from the two-stage chlorination, which was in turn more resistant to beating than the pulp from the single-stage chlorination. The unbleached pulp was, as might be expected, the most resistant to beating.

The development of bursting strength was at first similar for all the bleached pulps. The pulp from the three-stage chlorination method possessed slightly higher final bursting strength than the other pulps, with the pulp from the single-stage chlorination excelling somewhat over that made by the two-stage chlorination. All pulps appeared to be finally about equal to the unbleached pulps.

The tearing resistance of the pulp from the two-stage chlorination procedure may have exhibited, in general, some small advantage over the pulp from the three-stage chlorination method, and both were better than the product of the single-stage chlorination process.

While the data representing the folding endurance of the pulps were a little more difficult to interpret, pulps from the three-stage chlorination and the single-stage chlorination procedures seemed to exhibit comparable folding endurance during the earlier and later periods of beating, and were superior to the pulp yielded by the two-stage chlorination. The folding endurance of the unbleached pulp developed slowly but the final value was about the same as the maximum indicated.

The small differences between the several pulps pointed out should not obscure the general result that the beating and strength characteristics of the bleached pulps, regardless of the procedure used in bleaching, were quite close to each other and to the unbleached pulp. For practical purposes, no one pulp appeared to hold a consistent and marked advantage over another.

The viscosity values of the series of sulphate pulps representing the several bleaching procedures varied within the limits of 16.4 to 19.3 cP, a narrow range which indicated little or no practical advantage for any particular method of bleaching with respect to this property.

There appeared to be no significant difference between the final brightness of the pulps from the various bleaching methods.

The cost of the chemicals consumed in the chlorination, alkali, and hypochlorite stages of the representative sulphate bleaches was calculated. The results indicated that a saving of $0.68 per ton, or 14.7% of the cost of the chemicals, might be realized when employing a three-stage chlorination process with recycled liquors instead of a single-stage chlorination procedure. The inclusion of a second alkali stage between the second- or third-chlorination stage and the first hypochlorite stage did not appear to be economically advantageous. The two-stage chlorination method was only slightly more expensive than the three-stage chlorination method with recycled liquors, although there were indications that the two-stage chlorination might produce a pulp of somewhat lower brightness.

These studies have indicated that the chlorination reaction itself appears to be substantially completed in a short time, of the order of 5 minutes, after the initiation of the chlorination stage. A slow reaction then appears to set in during the remainder of the chlorination stage.

This investigation has further indicated that the bleaching of wood pulp may be best accomplished by chlorinating only to an optimum limit which is characteristic of the bleaching procedure employed and is dependent upon the properties of the pulp such as those relating to the cooking procedure and the chlorine demand of the pulp. The limits to which the pulp might be chlorinated by the several bleaching procedures appeared to fall within a narrow range, when integrating the chlorination with the bleaching procedure as a whole.

Chlorination beyond the optimum degree has achieved no improvement by itself nor have any potential benefits been realized in the succeeding stages, notably the alkali extraction stage. This has been exemplified by the single-stage chlorination bleaching of sulphate and sulphite pulps where uneconomic operation again resulted from utilization of quantities of chlorine greater than the optima. In a two-stage chlorination bleaching procedure the quantity of chlorine which might be introduced in the second chlorination stage was governed by consideration of the limited extent to which chlorination appeared to progress as well as by such practical factors as operating time and loss of unconsumed chemical. These considerations have been eliminated, however, in the threshold chlorination method embodied in a two-stage chlorination method for sulphite and a three-stage chlorination method for sulphate in which chlorine containing liquors are recycled from the last to the first chlorination stage.

The over-all trend has been toward more effective utilization of chlorine in the multichlorination methods with a limited increase in the extent of chlorination beyond that applied in the single-stage chlorination. The more effective use of chlorine has been reflected primarily in the cost of the chemicals for bleaching of sulphate pulp. This cost has decreased as the amount of elemental chlorine introduced has increased, although the total quantity

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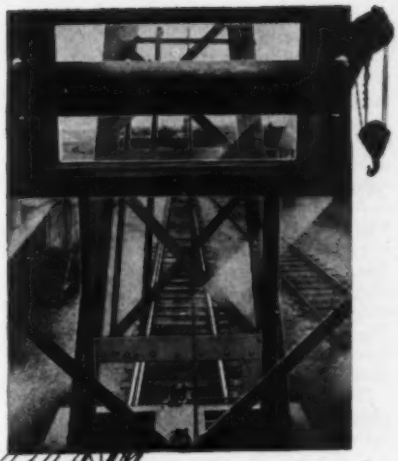

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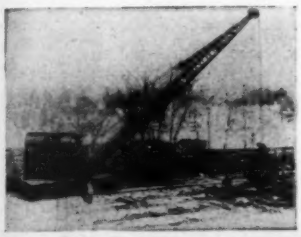

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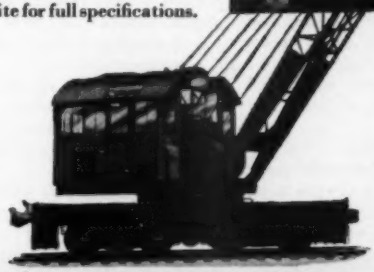

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of chlorine required in the form of chlorine and hypochlorite has remained substantially constant when producing pulps of comparable brightness and physical characteristics.

## White Water Clarification by Means of the Marx Filter


CLYDE A. BENSON[1], HAROLD E. BRAKEWOOD[2]


A Marx filter consists primarily of two large steel plate cones, one inside the other, with a space between them. The inner cone is truncated. There is also a small cone-shaped receiving well at the top and an inverted deaeration cone directly under the receiving well. There are no moving parts.

Before installing the Marx filter it is important to determine the volume of white water to be clarified, the concentration of suspended solids, and the rate of settling of the solids. This should preferably be done by installing a weir, according to TAPPI standards, in the mill tail race; a continuous liquid level recorder; a continuous sampling device; and a continuous temperature recorder. Daily composite samples of the white water should be analyzed for concentration of suspended solids and for rate of settling. From this data the proper size of filter to be installed can be determined approximately.

The Marx filter originated in England, the inventor being Robert Joseph Marx, of London. The invention consisted essentially in mechanically removing the air bubbles from the solid particles to which they adhere by causing the liquid to fall from a height, in the form of a thin film tending to divide up into separate drops, on to a hard surface (deaeration cone) prior to its entry into a container in which the solid matter spread over such surface by the division of the drops, is collected by settling down at its own proper specific gravity while the liquid flows out by the convenient outlets.

One board mill in which this filter has been installed is the Robertson Paper Box Co., Montville, Conn. This plant is located on the Oxoboxo River about 3 miles above its confluence with the Thames River. For many years, white water effluent from this one 6-cylinder machine, trimming 65 in., had been dumped into the Oxoboxo without restriction. Suspended solids at the rate of about 5 lb. per minute, or 7,200 lb. per day, were a source of stream pollution. About 2 years ago, a request was sent to the State authorities, demanding that steps be taken to improve this condition. As a result, the State Water Commission placed this responsibility directly in the hands of Robertson Paper Box Co. and it was understood that the results would be considered satisfactory if the effluent to the stream contained no more than 0.5 lb. of suspended solids per 1,000 gallons.

After due consideration, it was decided that this could be accomplished economically by collecting all the board mill white water at one point, passing it through a Marx filter, and recirculating it through exchange heaters to a storage tank supplying the beater room. The suspended solids would be continuously removed from the bottom of the filter and emptied into the filler stock breaker beater. The volume of effluent to the stream would be reduced from 100 gpm to the volume of fresh water added through shower heads, and the content of suspended solids in the effluent would be reduced from 5 lb. to 0.5 lb. per 1000 gallons.

New showers were installed on the cylinder machine to reduce the fresh water usage. There are now eleven showers delivering a total of 242 gpm. Assuming no other fresh water usage and drier evaporation amounting to 11 gpm,

**TABLE 1**

| | Suspended Solids —lb./M gal. | | |
|---|---|---|---|
| | To Filter | From Filter | % Removal |
| September .. | 5.13 | 0.68 | 84.9 |
| October ... | 4.84 | 0.50 | 88.1 |
| November .. | 5.09 | 0.29 | 93.8 |
| December .. | 4.75 | 0.32 | 92.3 |


(1) Associated with Arno W. Nickerson, Consulting Engineer; (2) Chemist, National Folding Box Company, Inc.

this leaves 231 gpm of effluent to flow into the stream.

The white water overflowing from the top liner vat is now kept separate from the filler white water and pumped through an exchange heater to the two 950-gallon tanks, which act as storage for furnishing the top liner beater, for jordan, screen, and head box dilution.

All other water from the mill is delivered to a 4,000-gallon tank from which it is pumped to the top of the Marx filter. The pump is direct driven by a 15-hp. motor. The average volume passing through the filter amounts to 1,000 gpm. The capacity of the filter is 79,000 gallons which means a detention time of 79 minutes.

The results of operation of the Marx filter at the Robertson Paper Box plant for the last 4 months of 1946 are shown in Table 1.

In addition to the alleviation of stream pollution which has been effected by the filter operation, there were substantial savings from the reduction of fiber and heat losses.

The figures shown in Table 2 are believed to be conservative. Operation costs, except for power, are practically nil since no chemicals are used and maintenance is of small consequence. No extra labor is involved in the normal operation of this filter.

At the mill of National Folding Box Co., Inc., New Haven, Connecticut, there are two board machines, one 6-cylinder trimming 122 in. and one 7-cylinder trimming 132 in. No basement exists under these machines, there being only relatively shallow pits under the wet end sections. All water (i. e., from the felt showers, from all vats, from the press section, and from floor drains) collects in the machine pits which are interconnected—and is pumped to a Marx filter system. This system consists of two filters, one with a holding capacity of 96,000 gal., which was installed in 1933, and the other with a holding capacity of 130,000 gal. installed in 1945.

All liquid wastes from the beater room section of the mill which cannot be immediately reused in the filler stock preparation equipment, after being screened for removal of rags, strings, and similar gross trash, are also pumped to the system. All sewer outlets are closed (except the one discharging excess clarified water from the filter system) and the net effect is that no waste water can leave the mill without first passing through the filter and being acceptably clarified.

Oil filters are placed at strategic points to remove and collect all lubricating oil which may be present and the water is chlorinated just prior to delivery to the system.

All concentrated effluent from the bottom of the system is reused for filler and back liner furnish plus jordan and stuff box dilution. The clarified top discharge from the filter is used for felt and cylinder shower supplies and the balance is discharged in waste. Plans are under way to utilize more of this clarified water for furnish and dilution purposes.

Average figures compiled at the National Folding Box Company from nearly 14 years continuous operation of one Marx filter show the following:

Influent ..... 2.7 lb. per M gal.
Effluent—bottom,
sludge ..... 5.1 lb. per M gal.
Effluent ton, clarified.. 0.26 lb. per M gal.
Fiber removal,
per cent .....90.3

*Acknowledgment*—The authors wish to express their appreciation to the Robertson Paper Box Company and National Folding Box Company, Inc., for permission to publish their results covering the operation of the Marx filter.

**TABLE 2**

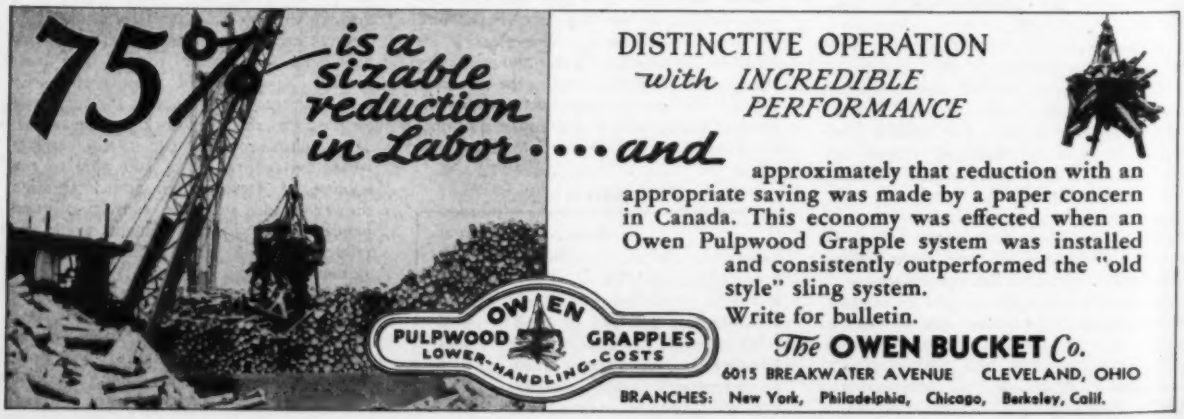
| | | Savings per Day | |
|---|---|---|---|
| *Fiber* | 4.5 lb./min. @$20.00 per ton..... | $ 64.80 | |
| *Heat* | 1000 gpm 10 deg. rise (average for year) steam @ $0.55 per M lb. ..... | 69.30 | |
| | | $134.10 | $134.10 |
| Less: | Extra power for pumps, 30 hp. @ $90/hp. year..... | $ 9.00 | |
| | Amortization 10% of $27,500, 300 days per year..... | 9.17 | |
| | Interest 5% ..... | 4.58 | |
| | Maintenance ..... | 2.00 | |
| | | $24.75 | 24.75 |
| | Total net savings per day..... | | $109.35 |

## Chlorite Bleaching of Southern Pine Kraft Pulp

**W. P. LAWRENCE, Research Engineer**
**The Champion Paper & Fibre Co.**

Shortly after sodium chlorite was made available on commercial scale by the Mathieson Alkali Works, laboratory investigations were made of its applicability to southern pine kraft pulp. Because of the relatively high cost of sodium chlorite, its utilization was limited in scope to a finishing bleach treatment of pulp previously bleached to G. E. brightness 60 to 70 by conventional methods. The objective sought was a pine kraft pulp of G. E. brightness 80 to 84, with a substantial retention of strength properties of the original pulp.

It has been pointed out in the literature (Taylor, M. C., White, J. F., Vincent, G. P., and Cunningham, G. L., *Ind. Eng. Chem.* 32, No. 7: 899-903, July, 1940) (Taylor, M. C., White, J. F., and Vincent, G. P., *Tech. Assoc. Papers* 23: 251-256, 1940) that sodium chlorite as such is relatively inert, but may be "activated," whereupon chlorine dioxide is liberated. This "activation" may be brought about readily by one of three agents, namely, acid, hypochlorite ion in alkaline medium, and chlorine. The first two of these three were deemed most suitable for pulp bleaching applications, and laboratory comparisons of the acid and hypochlorite types of activation were made on several occasions. The acid type of activation appeared to give the most consistently good results, but alkaline hypochlorite activation under proper conditions nevertheless gave quite favorable results.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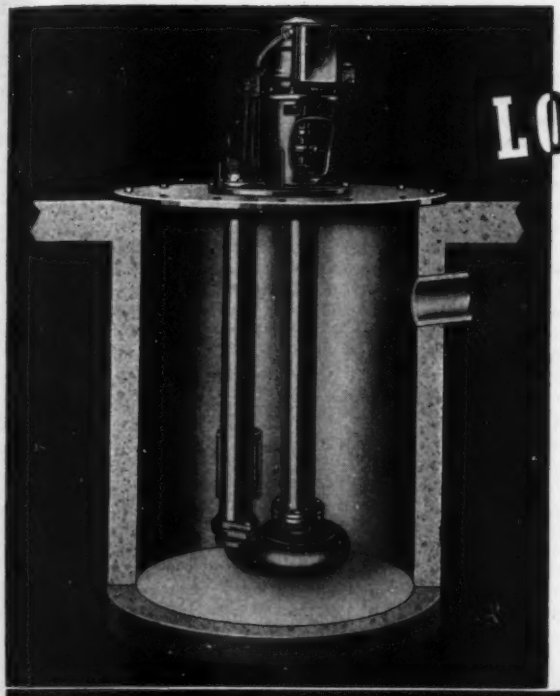

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In view of the favorable results obtained with alkaline chlorite, and the advantage it afforded in simplicity of application to existing equipment from the standpoint of corrosion, subsequent experimental studies were further limited to alkaline chlorite bleaching of previously dried kraft pulp.

The established, preferred technique of alkaline chlorite bleaching is to add first the desired amount of chlorite, equivalent to perhaps 0.5% available chlorine, basis pulp. After this is thoroughly mixed, and temperature and *p*H have been adjusted while the chlorite is still inert, calcium or sodium hypochlorite then is added, in amount perhaps equivalent to 1.0% available chlorine, basis pulp, making a total of 1.5% available chlorine. The bleaching action begins immediately upon the addition of hypochlorite, and is carried out for about 2 hours in the neighborhood of 5% consistency, 110 Fahr., and *p*H 8.5 to 9.

In a study of the time factor, it was found that the brightness gain was very rapid at the outset, and then levelled off. In one instance, the brightness after 1.5 hours was 80.0, while at 3 hours it was 83.0. In the *p*H range mentioned, higher alkalinity produced slightly better brightness, as for example brightness 81.0 at *p*H 9.0 vs. brightness 80.6 at *p*H 8.0.

The chlorite bleaching reaction seemed relatively immune to extraneous materials which have a significant effect on some bleaching reactions. The addition of soluble iron to the extent of 100 ppm basis pulp, decreased the ultimate brightness about 1 point, but failed to affect materially the rate of consumption of chlorite. The addition of a substantial amount of sodium peroxide had no effect on the rate of chlorite consumption nor on the ultimate brightness.

The preservation of pulp strength characteristics on bleaching with chlorite has been attributed to its lower oxidation potential. This characteristic is supposed to hold true even when hypochlorite is present as an activating agent, because the hypochlorite in theory reacts with the chlorite to form chlorine dioxide, in preference to reacting with and oxidizing the cellulose. In order to fulfill this condition, it obviously is important to have the chlorite and hypochlorite consumed at approximately the same rate, and in particular to avoid conditions whereby the chlorite would be consumed first and leave the pulp exposed to the action of excess hypochlorite with its higher oxidation potential.

It was found that the simultaneous rates of consumption of the two bleaching agents were affected by the proportion or ratio in which they were added and by *p*H. At *p*H 8.5, this desired, parallel consumption was obtained at a hypochlorite:chlorite ratio of something less than 2:1 and approaching 1:1. The ratios mentioned are in terms of available chlorine equivalents. At *p*H 9.5, the reaction proceeded best at a straight 2:1 ratio of hypochlorite:chlorite. Under certain conditions, such as 1:1 ratio of the bleaching agents at *p*H 9.5, practically no chlorite was consumed, and the bleaching action in this instance was essentially that of a straight hypochlorite bleach.

Alkaline chlorite bleaches were carried out for the most part at 5% pulp consistency. Parallel experiments indicated that bleaching at 3% consistency gave equal brightness values after 2 hours, gave approximately equal strength retention, and tended to retard the consumption of chlorite and thereby to minimize the danger of exposing the pulp to the action of hypochlorite alone.

An opportunity for applying alkaline chlorite as a finishing bleach was presented at the Hamilton, Ohio, mill. This is a paper mill only and receives its supply of pulp from outside sources, chiefly in the form of machine dried southern pine kraft from the pulp mills. By bleaching this pulp with chlorite at Hamilton, it was postulated that a pulp of 80 to 83 brightness could be produced from southern pine with strength characteristics comparable to those of more expensive pulps from outside sources.

This premise was borne out in a general way in mill trials, and resulted in a rather extended usage of sodium chlorite as a finishing bleaching under these conditions. The types of pulp processed and the equipment and techniques employed were subject to considerable variation, so that a coherent summary of these operations would not be feasible. An example will suffice to illustrate the general procedure followed and the results obtained.

As a matter of convenience, preliminary

trials were carried out in a wooden beater with steel tackle, and this proved to be generally satisfactory for this particular bleaching operation. The procedure was to charge the beater with 2,150 lb. air dry (1,940 lb. moisture-free) pulp of 70 to 72 brightness, which previously had been machine dried at the pulp mill. After the beater charge was thoroughly slushed, at about 5% consistency, commercial sodium chlorite equivalent to 9.7 lb. or 0.5% available chlorine was added and distributed well, in the solid form. Several minutes were allowed for circulation in the beater to insure good distribution. Meantime, direct steam was added to bring the charge to 110 to 115 Fahr. There was no bleaching action during this period since unactivated chlorite is relatively inert. Next, commercial calcium hypochlorite equivalent to 19.4 lb. or 1.0% available chlorine was added slowly in solution form. Bleaching action was apparent immediately upon addition of the hypochlorite.

The charge was circulated in the beater with the roll well off the bed-plate for 2 to 3 hours. During the bleaching cycle mentioned, approximately 5 lb. of caustic soda were added to keep the charge in the neighborhood of *p*H 8.5. After bleaching, the stock was wet lapped or vacuum washed, and used in the paper mill. Moderate losses of strength characteristics were experienced in some instances, but the general results in this respect were rather satisfactory. Brightness values in the range of 80 to 83 were obtained consistently.

**Acknowledgment**

Acknowledgment is made to the technical service staff of Mathieson Alkali Works for their co-operation and numerous suggestions in the course of these studies.

## Progress of Pollution Abatement in the Tennessee Valley

**W. G. STROMQUIST**
**Asst. Chief Public Health Eng.**
**Tennessee Valley Authority**

Stream pollution in the Tennessee River system originates mainly in the upper part of the valley with municipalities and industries in Virginia, North Carolina, and Tennessee. These three states have taken action to abate present pollution and to prevent, so far as possible, additional pollution. Tennessee passed a stream pollution law in 1945 and established a stream pollution control board which is as active as present limitations of personnel permit. In 1946 Virginia passed a pollution law and established a water control board which now is in the state of being organized. North Carolina established a stream sanitation committee consisting of representatives of state departments, municipalities, and several types of industry. This committee has requested an appropriation for making a survey so that legislation may be based on factual data. The National Council keeps those interested well informed on progress of legislation.

The Pollution Control Board of Tennessee includes the commissioners of health, agriculture, and conservation with two representatives from municipalities and two from industries. The chief sanitary engineer of the State Health Department serves as technical secretary to the board. The board has adopted general regulations which require mainly the following: new construction on new plants must submit plans of the waste collecting and disposal systems for review and approval. It will have supervision over maintenance and operation by requiring records and reports of operation and routine submission of samples. It will make investigations, reports, and recommendations, establish standards and criteria, and issue orders for necessary improvements. It will require permits to discharge sewage, industrial waste, or other waste.

After these regulations were adopted, copies with application blanks were mailed to all known municipalities and industries in Tennessee. It was required that prior to July 1, 1946, applications for permits must be filed with necessary data which will serve as a basis for issuing of tolerance permits. Such tolerance permits will specify needed time for necessary correction to be completed which will be set by the board after investigation of the particular problem of the municipality or industry. In many cases, sufficient data may be included in the application to serve as a basis for issuing a permit rather than just a tolerance permit.

The technical personnel has started concentrating its first work on the Holston River Basin in northeastern Tennessee.

The policy of the board is one of co-operation with municipalities and industries and to use the teeth of the law only in extreme cases. Many communities in the state have employed consulting engineers to prepare plans and apparently expect to construct treatment plants as soon as possible.

The TVA has co-operated with the State Pollution Board in surveys with its mobile laboratory. In the summer of 1946, an extensive survey was made of the south fork of the Holston River. Here sampling was done, not at specified points at specified times, but with the co-operation of the hydraulic data division to note stream flow and estimate time of travel between points. The samples were collected at definite time intervals from the point of discharge and as nearly as possible from the same suction of water.

The pollution board appointed a technical committee which included representatives of interested state departments, a water plant operator, a representative of industry, and a representative of the TVA Stream Sanitation Staff. This committee developed general criteria for the definition and control of pollution in the waters of Tennessee. Their report was reviewed by representatives of various federal agencies.

Several instances can be given of co-operation between state agencies, TVA, and industry. A notable one is that of the Mead Paper Corporation at Harriman, Tennessee. This presented a rather unusual problem. When the Watts Bar Dam was built on the Tennessee River, the water backed up to Clinch River and into the Emory River, a tributary which enters the Clinch 4.4 miles above its mouth. Norris Dam, forming a deep storage reservoir, is located about 80 miles above the mouth of the Clinch. The town of Harriman is about 13 miles above the mouth of the Emory with the outfall of the paperboard mill 11.3 and the water works intake 12.8 miles above the mouth of the Emory. Water is discharged from the penstocks of the Norris Dam at an approximately uniform temperature of 52 Fahr. the year around. When the Norris hydro plant is operated in the late summer and fall and the cold water reaches the Emory River, it flows upstream at the bottom to the upper end of the backwater just above Harriman and carries paper mill waste and city sewage to the intake of the water works. This creates a serious problem from taste, odor, and color in the domestic water supply. The Harriman mill uses the semichemical process, digesting dead chestnut chips.

As temporary measure, the Mead Corporation constructed a lagoon for storing the digester liquor and obtained a tow boat and barge for barging the digester liquor to the main Tennessee River where it is discharged over a large area. A Dorr clarifier was also installed where the white water is settled after treatment with lime. The resulting sludge was found to be very difficult to dehydrate, so that at present it is barged downstream together with the digester liquor. The Chemical Engineering Department of the TVA is co-operating with the Mead Corporation in trying to develop methods of dewatering the sludge so that the lime can be re-used for coagulation or made into agricultural lime.

A former employee of the Mead Corporation has applied for patents together with the Mead Corporation on a method of recovering the semichemical digester liquor by burning the sulphur and carbon without forming sodium sulphide and recovering the sodium as the carbonate. This proposed process is awaiting final tests with suitable equipment to effect the type of burning required. It is estimated that the heat recovery together with the chemical recovery will pay for the operation in the semichemical process, while when applied to the sodium base acid sulphite process, a substantial saving is indicated.

About three years ago, the Champion Paper and Fibre Company at Canton, North Carolina, the largest paper mill in this section, announced a $5,000,000 construction program. Because of increased costs of labor and material, it is now estimated that the completion of work will involve somewhat greater expenditure. While the major purpose is to increase pulp and papermaking capacity, the program also includes waste-recovery equipment; and it is estimated that about one-third of the expenditure will have a direct effect of reducing the pollution in the Pigeon River which empties into the French Broad which joins the Holston River to form the Tennessee.

The TVA, in co-operation with the state health departments and the U. S. Public Health Service, made the original stream pollution survey of the tributaries in 1937 to 1939. Since that time the Ecusta Paper Corporation installed a plant

in the upper reaches of the French Broad River, so that in the fall of 1944 another survey was made by the trailer laboratory It was found that the Ecusta Paper Corporation was also making a study of the French Broad River, and an interchange of data was made. In comparing results for a similar period, a remarkable correlation of data obtained by two organizations working independently was found.

Pollution from domestic sewage and industrial waste is still entering the Tennessee River system very much the same as it has been doing in the past. However, those who are interested in a clean Tennessee River are looking forward optimistically to marked improvement in the not too distant future.

## Turbine Installation and Maintenance

**HANS P. DAHLSTRAND**
**Consulting Engineer, Steam Turbine Dept. Allis-Chalmers Mfg. Co.**

A number of different types of steam turbines have been developed since the first commercial unit was put into operation. Each of these types of steam turbines fits into some certain specific condition existing in an old power plant or in a new power plant, and type chosen depends on the service the turbine is to perform.

The steam turbine types generally selected for different operations consists of:

(1) Straight condensing units where the high pressure steam passes through the turbine into the condenser without any automatic bleeding of the steam. These types of units are practically always provided with openings so that steam may be bled for feed water heating.

(2) Condensing bleeder turbines where the steam is bled at a constant pressure and at one or more points to furnish steam for various purposes and the balance of the steam condensed in the condenser. Additional bleeder points for heating the feed water may be provided if found desirable The pressure in this case will vary with the load and the amount of steam bled at the constant pressure bleeder points.

(3) Noncondensing back pressure turbines where all the steam entering the inlet is exhausted at a certain definite pressure and the steam used either for low pressure turbines or process work.

(4) Noncondensing bleeder turbines where steam is bled at one or more points at constant pressure. The exhaust steam in this case is used for heating or process work.

(5) Mixed pressure turbines where the steam is admitted to the turbine at more than one pressure.

The problem of adopting higher pressures and temperatures in industrial plants is generally quite different from that in central power plants. This difference is mainly because of the requirements of process steam in combination with power. So for example, steam may be used for heating and process work with varying pressures and temperatures. For that reason it may be necessary to install either high back pressure turbines, bleeder turbines, or both. Other consideration may also influence the type of installation. It is, of course, vitally important that the maximum economy is obtained. Due consideration should also be given to future changes which may take place.

The successful and efficient operation of steam turbine generating units requires not only the maintenance of the various elements in a first class mechanical condition but also that the operating conditions are kept within the limits specified. This latter is important for the reason that the unit is designed for best efficiency when operating at certain specified conditions.

### Steam Turbine Maintenance During Operation

The condition of the steam coming from the boiler must be free from carryover which will settle on the blading and thereby reduce the capacity of the turbine or settle on valve parts, which in turn will interfere with regulation on account of sticking of the valves. The steam should also be free from any corrosive element that may damage internal parts of the unit.

Strains set up by the uneven expansion are very often the cause of vibration and if of sufficient magnitude, may cause permanent distortion or failure because of excessive stresses. It is well worth while to check the expansion of the complete steam turbine as this check will indicate whether there is any interference in the free expansion of the unit. It may also indicate whether there are any internal changes in temperature distribution inside the turbine cylinder. Any such changes in temperature will cause the unit to expand more or less, depending upon whether the average temperature is increasing or decreasing. Any such changes should be thoroughly investigated as they may indicate that a serious condition exists in the proper distribution of the steam in the turbine blading.

### Vibration

Another check that should be taken at frequent intervals and entered into the log sheet is the vibration of the unit at the bearing pedestals. It is realized that there may be changes in vibration with changes of load due mainly to the difference in temperature distribution in the unit. However, the readings will be of real value when used as a comparison with other readings taken from time to time as they will indicate whether there are any changes in the smooth running of the unit.

### Clearance Check

The efficiency of the turbine unit is to some extent dependent upon the maintenance of certain close clearances in the blading and the dummies. It is of considerable importance that the turbine unit is equipped with means that will permit the operator to check these clearances at all

(*) Abridgment of paper presented at the TAPPI Engineering Conference held in Milwaukee, Wis., October 2-4, 1946.

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times Of considerable importance is a measuring device that will indicate the axial clearances between dummies and balance piston surfaces.

**Glands**

The glands at the ends of the turbine shafts are of the labyrinth, carbon or water seal type, or a combination of two types. Their function is to prevent air from leaking into the vacuum space or steam leaking out into the air when the inside pressure is above the atmospheric pressure. The operation of the glands is in general automatic when once properly adjusted. During operation, it is only necessary to check the conditions and take readings of any instruments used for checking the conditions.

In the water seal gland, it is necessary that the proper amount of water is allowed to pass through the gland in order to prevent steaming and also that the water should be of such a character that there will be no scaling of the gland from lime or other foreign matter.

**Lubrication**

In high speed machinery such as steam turbines, the proper lubrication of bearings and other parts is of vital importance. The shafts are supported on a thin film which prevents metallic contact between the journal and the bearing shaft. In order to maintain this film, the oil used must be a certain quality free from any dirt and maintained within a certain limit of temperature. It is difficult to build a system which will prevent any foreign matter coming in contact with the oil and it is, therefore, necessary to provide filters and strainers in the oiling system in order to maintain the oil in the proper condition. Usually it is customary to provide a continuous filtration system that will maintain the oil in a clean condition during long periods of time. However, it is good insurance to make tests of the oil from time to time to see that there are no changes in the lubricating qualities of the oil. The system should be arranged so that no water can enter the oiling system. Water will not only emulsify the oil but when mixed in the oil and circulated through the system, it will cause corrosion of various parts. This condition is particularly harmful when oil is used in the regulating system. The temperature of the oil should be measured before and after going through the cooling system as well as at the discharge from all the bearings. Any changes in temperature may indicate either that the oil flow to the bearing has changed or that some internal change has taken place in the bearing itself, in which case the bearing should be inspected without any unnecessary delay.

**Governor Gear**

The governor gear is an important and essential auxiliary to the steam turbine. The standard speed governor controls the opening and closing of the steam inlet valves as the load on the unit changes. It is, therefore, readily understood that it must be maintained in perfect operating condition at all times. The moving parts, such as levers and links, are numerous and consequently proper lubrication is essential in order to prevent, as far as possible, any excessive wear in pins and bushings. Certain parts of the governor itself are enclosed and consequently can be lubricated from the continuous steam turbine lubricating system. Other parts, such as connections between the governor and the inlet valves, must be lubricated by hand at stated intervals.

The governor is usually driven from the turbine shaft through worm gears. These gears are also subjected to wear and it is of considerable importance that these gears be inspected at frequent intervals in order to prevent any serious shutdowns through the breakdown of these gears. It is also advisable to check the wear in pins and bushings in the connection between governor and inlet valves whenever the unit is shut down. Usually the valves are operated by means of oil pressure actuating a power piston. The relay valve connected to the governor, which controls the movement of the inlet valves through the power piston, should also be inspected whenever there is any suspicion that there might be sticking during operation.

**Inlet Valves**

The inlet valves controlling the steam flow to the turbine must be maintained in proper operating condition at all times. It is essential that the valves move freely without any sticking. The sticking of these valves may be caused either by carry-over with the steam or by improper adjustment of the glands. The tightening of the gland should be just enough to prevent steam leaking through the gland, as tightening beyond this point may cause sticking. When the unit is shut down, it is advisable to move the valves up and down several times by means of the relay valve in order to check whether the vales are functioning properly.

**Throttle and Trip Valve with Trip Mechanism**

A combined throttle and trip valve is used for admitting and closing off steam to the unit by hand or by automatically shutting off of the steam to the unit in case of overspeed. During operation this valve is always in a stationary position and, therefore, may stick, particularly if there is any carry-over from the boilers. There are also other possibilities that may cause sticking of this valve, such as deterioration of the gland itself. In order to maintain this valve as far as possible in proper condition during operation, instructions should be issued to the operator to partly close and open this valve at definite periods. Usually the proper time to do this is when there is a change of operators. This partial closing should be recorded on the log sheet and if there is any unusual action of the valve when operating in this manner, it should be recorded. It is understood, of course, that the valve cannot be closed more than a certain amount, depending upon the load being carried on the unit at that time. With this operation of the throttle valve, the operators may be reasonably sure that the valve will move freely in that part of the stroke it has moved during this operation and consequently the valve can be assumed to operate without any difficulty in case of an emergency. If there should be any sticking in the last part of the stroke undoubtedly that will not be serious enough to prevent the valve from closing because of the accumulated energy stored in the moving parts of the valve during the first part of the stroke.

The tripping mechanism between the centrifugal stop governor and the throttle valve must also be maintained in good operating condition. Naturally the various bearings, pins and bushings are lubricated at definite intervals. Usually the mechanism cannot be operated except when the unit is shut down. However, when ever the unit is shut down, it is customary to pull the hand trip lever in order to be sure that the whole mechanism as well as the throttle valve is functioning properly. The centrifugal stop governor can usually only be operated by overspeeding. In some cases the stop governor is arranged so that it may be operated by an oil pressure mechanism actuating on the governor. With proper precaution this can be done while the unit is in operation. Usually the stop governor is of such a design that the chances for any difficulty are very slim. The tripping mechanism with connections to throttle valve is more likely to cause sticking, consequently it is not of great importance that the stop governor is arranged to be tested under normal speed.

It is advisable to overspeed the unit in order to test not only the overspeed governor but also the complete mechanism, together with the throttle valve. This overspeeding can only be made when there is no load on the unit, therefore, the testing at specific intervals is not practical. Instructions covering this overspeel testing should be obtained from the turbine manufacturer.

**Records**

Pressure and temperature readings at various points in the steam turbine unit will usually indicate whether the internal condition of the unit is being maintained. If there are any changes in pressures and temperatures with the same steam and pressure conditions and with the same load, it usually means that some change has taken place in the internal condition. These changes may consist of changes in internal clearances or loss of blading. Loss of blading will manifest itself by change in the vibration. Changes in internal clearances, however, may take place without there being any outside indication of any change. It is, therefore, of certain importance that a complete record is kept of pressures and temperatures at various points of the unit. Usually these pressures and temperatures are taken at the point where steam is bled for feedwater heating. In the superheated region, a check can be made of the internal efficiency of the sections of blading between various points and by this means changes in the internal efficiency may be discovered. The records will permit the operators to make comparisons from time to time.

**Inspection**

A thorough periodic inspection of all the elements of the turbo-generator unit is required in order that the unit shall

fulfill its function reliably and efficiently. The time between such inspection is determined by the conditions in the power plant and also whether there are any unusual occurrences in the operation of the equipment. It has been the custom in the larger power plants to make an annual inspection of the steam turbine unit and arranged this inspection at a time when it would interfere the least with the operation of the power system. Lately some power plants are now making this inspection of the turbo-generator equipment once every two years. Undoubtedly where conditions are ideal, this periodical inspection may even be extended to three years. It is, however, advisable, before any definite decision is made concerning this periodical inspection, to consider the various conditions that affect the reliability of operation and also consult with the manufacturer for his opinion.

Before the machine is shut down for this periodical inspection, a definite program covering the complete inspection should be made up beforehand so that there will be no loss of time between the shutdown and until the unit can again be put in operation.

If there are parts that require replacement, they should be inspected immediately the unit is taken apart and if not carried as spares, orders should be placed without any delay as the manufacturer may not carry these parts in stock. When arranging the program this should be kept in mind and the program should be so arranged that the order of dismantling and inspection will take into consideration the time element so that the complete inspection may be finished without any undue delay.

When arranging the program for the inspection, it is advisable to make up beforehand certain tables or charts on which can be recorded any measurements or notes giving information concerning the condition of the various elements. When the inspection is completed and the unit is again put into operation, these records and notes may very profitably be bound in a book covering the complete inspection. This book will then be available for references and the condition of the unit can be compared with the condition found at subsequent inspections.

**Checking all Clearances**

When the load is taken off the turbine and the unit shutdown for inspection, it is advisable to ascertain the minimum hot axial clearance between spindle and cylinder. Usually the minimum clearance exists in the axial dummies. This hot clearance or striking point can be obtained by pulling the spindle forward as far as it will go until it strikes the dummies and then pushing it in the opposite direction until it again strikes the back of the dummies, and after each movement measure the position by the measuring device mentioned in the previous part of this paper. The forward movement will give fairly accurately the actual running clearance. These striking points should be obtained either when the spindle is rotating at slow speed or immediately after it has stopped turning and before any appreciable change in temperature has taken place. These measurements can then be used as a reference in determining the relative position of the spindle to the cylinder when at operating temperature.

As soon as the unit is shut down and has cooled off sufficiently to dismantle, the lagging will be removed, the horizontal cylinder joint unbolted, and cylinder covers lifted, likewise all the bearing covers for the unit are removed. By that time the cylinder and the spindle have cooled down near to the room temperature.

Before the spindle is removed from the cylinder it is important that complete measurements of all clearances are taken and recorded. These measurements consist of axial and radial clearances of the blading, axial clearance between balance piston and dummies and radial clearances between spindle shaft and gland and oil baffle dummies. If the turbine spindle, by the time the measurements are completed, is cooled down evenly to the room temperature, it is advisable to rotate the spindle and check whether it runs true. Later, before the turbine is again reassembled, it should again be checked to see whether it runs true and a record made of this check. The coupling between turbine and generator should be disconnected before this check is made.

While the above measurements are

**Vertical Type**

Ingersoll-Rand Class VGV vertical stock pumps are particularly adapted to situations where the suction conditions and location would not be favorable for horizontal pumps and where installation space is at a premium.

The pump casing is arranged so that the unit may be dismantled without disturbing the discharge piping.

It is possible to install this type of pump in a pit and have the motor safely above any normal high-water level.

These, and many other refinements of design, are completely covered in Ingersoll-Rand's bulletin No. 7022. Write for it or call an I-R engineer for further details.

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taken and recorded, other parts of the turbine unit such as the throttle valve, steam strainer, inlet valves, etc., with any other parts of the equipment that require inspection can be dismantled so that there will be no unnecessary delay in completing the inspection.

**Cylinder**

In spite of all the care taken in preparing the materials for the steam turbine cylinder, some distortion after certain periods of operation may take place. It is, therefore, advisable to check the various bores in the cylinder to determine the actual shape as it is sometimes possible to partly correct the detrimental effect of this distortion. Likewise, the cylinder joint between the upper and lower half of the cylinder should be thoroughly inspected and any high spots on the joint, which may prevent the making up of a tight joint, should be filed down until the joint surfaces are in contact at all points where the actual seal is made. This inspection of the surface should be made both in transverse and longitudinal directions.

**Worm Gears**

The worm gears driving the speed governor should be checked before the governor is dismantled from the turbine. This check consists of measuring the clearance or backlash between the teeth at the contact point. A record of this clearance should be made so that each subsequent inspection may be compared and the rate of wear of the gear determined. With this check, it is possible to predict fairly definitely when the gears need replacement.

**Governor and Connections**

The condition of the governor should be checked as there are various parts, such as pins, and bushings, that are subjected to wear and it may be necessary to replace some of these parts. The bearings for the governor spindle should, of course, also be checked to see whether there is any wear in these parts. Likewise all the governor links and levers connecting the governor gear with the main inlet valves should be checked to determine whether any wear has taken place in the bearings and bushings of these parts. In making all these checks, as mentioned before, it is advisable to make a record of not only the wear that has been found, but also a record of parts that are in good condition as in this way a comparison may be made of the conditions at each subsequent inspection.

**Throttle Valve**

When shutting down the unit for inspection, the operation of the main throttle valve should be checked to ascertain whether it operates properly. Tripping of the throttle valve is usually done by pulling the hand trip lever as soon as the load on the unit is taken off. In addition, after the unit has come to rest and the shut-off valve in the steam pipe to the turbine has been closed, it is advisable, before dismantling the throttle valve to operate the valve with the tripping mechanism in order to ascertain whether it operates satisfactorily. During this tripping, a check should be made to determine the time it will take between pulling the hand trip lever until valve is seated. A record of this operation should be made and kept for future comparison.

As soon as the valve is dismantled, a thorough check should be made on the conditions of the valve seat, guides and bushings, and measurement taken to see whether there is any wear in any of these parts. The valve stem should be checked for trueness to see that the stem has not distorted during operation. Any distortion may cause the valve stem to stick at some point and thereby interfere with the proper closing of the valve. It is understood that after inspection is made of the turbine unit and all the parts reassembled, that the throttle valve should be thoroughly tested out a few times before putting the unit in operation and the closing time again checked and recorded. This is of importance when reassembling and adjusting the gland, as it may have been improperly adjusted and other parts incorrectly assembled. It is vital that anything wrong is discovered before starting the unit. If during the inspection the valve seats show signs of leaking, the valve seats should be ground in with the valve in place.

**Inlet Valves**

The inlet valves also require a checking over and as soon as dismantled parts should be thoroughly inspected and if any new parts are required, an order for these parts should be placed immediately as it usually takes a few days to manufacture such parts. The valve seats should be thoroughly checked and, if required, should be ground in. Clearances in guides and bushings should be carefully checked and if larger than specified, this condition should be called to the manufacturer's attention because too large a clearance in the inlet valve guides may cause vibration of the valves when the valves begin to open. When reassembled, the valve should be thoroughly tried out and the glands adjusted so that there will be no excessive friction between valve stem and the gland itself, as any sticking will interfere with the proper regulation of the turbine unit.

**Thrust Bearing**

The thrust bearing maintaining the axial position of the spindle with relation to the cylinder is a vital element in a steam turbine unit. It should, therefore, receive a thorough check whenever the unit is down for inspection. Before dismantling the thrust bearing, the axial clearance or float between the thrust faces should be checked. After dismantling, the condition of the bearing surfaces should be carefully inspected in order to make sure that there are no flaws in these parts. When reassembling the bearing, the clearance or float between the thrust surfaces should be readjusted to that specified by the manufacturer. Usually this clearance is from about .006" to .010", depending upon the size and type of bearing. The thrust bearing adjusting gear should also receive a careful check as those parts are subjected to wear.

**Main Oil Pump**

The main oil pump or pumps, driven through worm gears from the turbine spindle, should also be dismantled and a careful check made of the condition of the pump parts. This pump is usually of the positive displacement type, the most common pump consisting of two or more gears. The condition of the rotating parts as well as the bearings and housing should be checked to see that there is no wear. Proper clearances must me maintained both in the bearings and between the gear and housing, in order that the pump may deliver its rated capacity. The actual clearances should be obtained from the manufacturer as they may vary depending upon the size and construction of the pumps. In all cases, a record should be made of the condition and the clearances so that comparison may be made at each inspection.

**Auxiliary Oil Pump**

The auxiliary oil pump used principally when starting, shutting down the steam turbine unit, or for emergency purposes, should receive a thorough check. It is of vital importance that this pump is maintained in good operating condition at all times. Normally this pump is of the centrifugal type and driven by a small steam turbine. In many cases two auxiliary oil pumps are furnished, one steam turbine driven and one motor driven. The motor driven in that case is normally a gear type pump. Both the centrifugal and the gear type pump should, of course, be inspected for wear in the various parts, the same as the main oil pumps, and records made of their conditions.

**Oil Pressure Regulator**

Another element of vital importance is the pressure regulator controlling the steam flow to the steam turbine driven auxiliary oil pump. This regulator is operated by the oil pressure in the system and arranged so that when the oil pressure falls below a certain point, the regulator will open the steam valve and start the auxiliary oil pump. When the pressure is sufficiently high, the regulator will shut off the steam. This regulator will operate in case the main oil pump stops.

**Inspection of Steam Turbine Driven Generators and Exciters**

A regular schedule of inspection should be adopted and maintained for generators and exciters as soon as they go into service. Modern, closed ventilating systems prevent any great accumulation of dirt, or foreign material in the generator but there are certain parts such as collector rings, commutators, and brushes which should have frequent and regular attention. Some units often run for months without a shut-down and during these periods, of course, only superficial inspection can be made. The following general outline is intended to cover the most important features of inspection and maintenance.

**Generator Armature Winding and Leads**

Turbine generator units are usually shut down for an inspection of the turbine at lease once a year. At this time the end

covers should be removed from the generator and the armature coil ends, connections, and leads carefully examined. Even in a closed system of ventilation there will be some accumulation of dust and this should be blown out with compressed air. Condensation often occurs in air lines and care must be taken that the air is free from such moisture before it is directed into the generator. After blowing out thoroughly, all exposed surfaces may be wiped off to remove any remaining greasy dust or dirt.

The bracing and cording of the coil ends and leads should be examined for any evidence of looseness. Stresses set up by short circuits or vibration may cause damage and consequent movement of these parts. If there are any sign of movement or chaffing the bracing must be renewed.

The compact construction of the rotor prevents any internal inspection. However, the fans and all bolts and nuts may be examined for any signs of looseness.

After cleaning, the coil ends and connections should be given one or two coats of air drying varnish. This is best applied with a spray in thin coats.

Care must be exercised in removing and replacing the end covers in order to prevent injury to the insulation of the coil ends.

**Generator Collector Rings and Brushes**

These should be inspected daily to be sure that there is no sparking, pitting or undue wear and that the brushes are uniformly seated on the rings. Each brush should have just enough clearance in the holder to move easily in a radial direction with respect to the ring.

In general, brush pressures on generator collector rings vary from 2 to 4 lb.-psi, depending upon the grade of brush used, current density in the brush, and speed of the collector rings. The manufacturer should be consulted for definite recommendations as to the proper brush pressure for each generator.

Replacement will be necessary from time to time due to brush wear. The grade of brush should not be changed without first consulting the manufacturer since he is best qualified to recommend the proper grade.

When installing new brushes they should be carefully fitted to the collector rings so that they make uniform contact over the entire face of the brush. Coarse sandpaper may be used first and the final fit made with fine sandpaper. Emery paper or carborundum should not be used. The sandpaper may be inserted under a few brushes at a time, rough side against the brushes and with moderate tension on the brush springs. Care must be taken to keep a fairly large arc of contact between the paper and the rings to avoid rounding off the leading and trailing edges of the brushes After running for a few hours the brushes should be examined and if not well seated, further sanding should be done.

There will be some accumulation of carbon dust on the shaft, rings, insulation, and brush rigging due to the brush wear. This may be blown or wiped off when the machine is shut down.

Where the brushes and rings are subject to severe service, it is good practice to reverse the two field leads occasionally. This reversed polarity often improves brush operation.

No oil or grease must be allowed to get on the collector rings or brushes

**Bearing Insulation**

The outboard bearing pedestal of steam turbine driven generators is insulated to prevent the circulation of shaft currents. Oil piping connected to this pedestal also will have an insulated union. Direct connected exciters and piping are similarly insulated. Ordinarily this insulation requires no special attention except that it should not be painted with metallic paint. In case the rotor, or exciter is removed all joints must be carefully reassembled so that the insulation remains effective. One small metallic chip or sliver in the bottom of a bolt or dowel hole can destroy the value of the insulation.

**Main and Pilot Exciters**

Exciters may or may not be enclosed. In any case any accumulation of dust should be blown out at regular intervals with dry compressed air. All exposed parts should be wiped clean with a dry cloth. In using compressed air, any foreign material should be blown out and away from the machine and not down into any of the crevices formed by the armature coils or commutator connectors. After thorough cleaning, one or two coats of thin air drying varnish sprayed on the coils and insulated parts will preserve the insulation and prevent absorption of moisture. This should be done at least once a year.

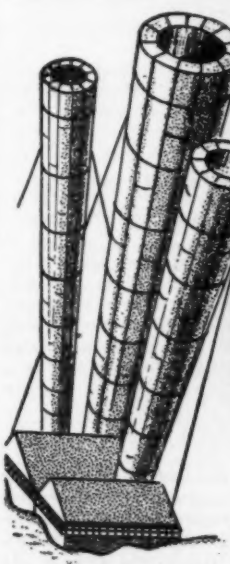
**Exciter Commutators**

Seasoned commutators usually require no special attention beyond keeping them free from oil or grease. After some years of service, they may require turning to get a true, uniform surface. After turning, it may also be necessary to undercut the mica insulation between bars. The turning or resurfacing is preferably done with the armature running in its own bearings and at normal speed although this may not always be possible. The final finish should be given with fine sandpaper or sandstone taking precautions not to form any flat spots on the commutator surface. On high speed units this resurfacing requires considerable care and should only be attempted by an experienced operator.

**Exciter Brushes**

Brush operation should be inspected daily and notation made of any irregularities such as unusual wear, sparking or vibration.

Brush pressures on exciters should be maintained at 2 to 2½ lb. per sq. in. All brushes must be uniformly seated and the commutator must be smooth and true. In case of replacement of brushes due to wear, the same general method is used as outlined for brushes on collector rings. Carbon particles resulting from the sanding operation must not be allowed to get into the armature windings.

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**Insulation Resistance**

It is good practice to keep a record of insulation resistance on the generator and exciter. Readings may be taken by means of a suitable megger, ohmmeter, megohmer, or with a high resistance voltmeter in series with the circuit. In the latter case, a direct current supply of 500 volts should be employed since the insulation resistance is apt to show a lower value the higher the applied voltage.

Insulation resistance readings should be taken when the machine is hot. If all readings are taken at approximately the same temperature, an abrupt change in the insulation resistance has more significance than the actual value in megohms.

**Vibration and Coupling Alignment**

When shutting a generator down, vibrometer measurements may be made from full speed to standstill. A continuous record of such readings is useful to indicate any changes which may take place and cause variation in the balance of the unit. Such readings may be taken during the starting period but the deceleration periods usually affords more time to get accurate readings.

Vibration may cause loosening of the dowel pins and holding down bolts on the generator or exciter. These should be tested occasionally for tightness by sounding with a hammer or using wrench.

Under normal operation, the generator rotor will run with practically no end play or oscillation in an axial director. The generator rotor bearing nearest the main coupling has thrust collars which prevent such movement. After some years of operation, a tendency to oscillate may appear. This may be accompanied with a pronounced bumping on the thrust collars. This is usually caused by coupling wear or misalignment and the coupling should be thoroughly checked.

**Bearings**

It is imperative that no oil escape from the bearings and get into the generator or exciter windings. Frequent inspection should be made for such leakage. The generator end covers are provided with observation windows which permit internal inspection of the bearings, shaft, and coil ends.

**Rating**

Each generator and exciter carries a nameplate which gives the normal allowable load and temperature rise. These values should never be exceeded without first consulting the manufacturer.

When ordering replacement parts and supplies, always give the serial number of the machine and any other data which appears on the nameplate.

**Repairs and Supplies**

When ordering replacement parts and supplies, always give the serial number of the machine and any other data which appears on the nameplate.

**Reassembling**

The reassembling of the various elements of the turbine unit should be arranged in accordance with a set program or schedule so that the unit can be ready for operation without any loss of time. With this in mind, and while the main parts are being inspected, the smaller items, when ready, can be assembled.

There are a few items when assembling that require a careful check in order that the completed unit shall be in proper condition when ready for operation. When the blading in the turbine spindle and cylinder and other parts of these elements have been inspected and found in good condition, the spindle is assembled with the lower half of the cylinder. Before any further assembling, measurements of all the clearances in blading, glands, etc., should again be taken and recorded in the same manner as mentioned in a previous paragraph. This checking of clearances can then be compared with the previous measurements. An accurate record covering the internal conditions of the unit is than obtained when all parts are at room temperature.

The alignment of the turbine spindle to the generator rotor should be checked and accurately adjusted to insure a smooth running of the unit. The two shafts should be arranged so that under running conditions, the ends are in exact alignment with each other and the centerlines of the two or more shafts should form a smooth curve coinciding with the deflection curves of the shafts.

Another item of considerable importance is the making up of the main cylinder joint. The different manufacturers use somewhat different methods and naturally the engineers having charge of the inspection are fully familiar with the various detail parts. It is, as mentioned before, important to have the joint smooth without any high spots so that when the nuts are tightened, uniform pressure is applied on the joint surfaces. The bolts should be lubricated by some special compound specified by the manufacturer before the nuts are assembled with the bolts. This compound, if made up of the proper materials, will permit the nut to be removed without galling of the threads.

After all the parts have been reassembled and unit is again ready for operation, care should be used in starting it up for the first time after inspection. Before any steam is admitted to the unit, a check of the float or clearance between the front and the back of the dummies should be made and comparison made with previous check. If the unit has a micrometer device, the relative position of the dummies in the cylinder and the balance piston should be obtained at the same time.

The oiling system should be thoroughly flushed by starting the auxiliary oil pump and operated for some time so that any loose grit or dirt will be washed out and carried back to the oil tank. If unit has a turning gear, it should be started and a small amount of steam admitted. This operation should be continued until unit is ready to be brought up to normal speed. If there is no turning gear, enough steam should be admitted that will allow the turbine spindle to rotate at low speed. The warming up of the unit the first time after inspection should be done slowly to be sure that there is no interference between the rotating and the stationary parts. During this time and during the time the unit is brought up to speed, the operators should listen for any internal rubbing or noises to be sure that there are no contacts between rotating and stationary parts. After the unit is up to speed, it should be loaded in accordance with instructions and the usual checking and recording of clearances between the rotating and stationary parts should be taken.

## What's New in News Ink?*

**WM. G. FORSTER—GEO. H. MORRILL**
**General Printing Ink Division**
**Sun Chemical Corporation**

Penetrating inks such as newspaper inks depend for drying entirely on the absorbency of the papers on which they are printed. It is really astounding when one thinks that an ink will stay wet on the press almost indefinitely and yet can be prepared with such an affinity for paper that even at press speeds of 45,000 per hour, the ink is virtually set as the papers are delivered from the press. Newspaper inks vary in construction from simple mixtures of mineral oil and pigment to those containing a resin mineral oil solution plus pigment. This type of ink is not adapted for printing on hard surfaces of paper and the print produced on most absorbent sheets is generally soft and not resistant to smudge. This characteristic is one of the fundamental reasons for offset and the lack of sharpness on first impression pages.

The greatest problem in the drying of newspaper inks is the element of time at high press speeds in the range of 1,200 fpm. This means that between first and second impressions there is approximately only one-tenth of a second to accomplish complete drying so that there will be no transfer of ink to the second impression blanket from the freshly printed first impression.

The physical handling of ink in modern pressrooms presents further problems. The ink must have flow characteristics to meet the requirements of ink handling systems and automatic press fountains. In making the flow characteristics satisfactory for these requirements other objectionable difficulties such as "misting" or "flying" may result.

A further problem in connection with fast drying is that ink must have stability during long press shutdowns. In other words, the ink must be made to dry fast enough on the paper, but it must not dry on the press while it is stopped.

Oxidizing inks involve a process of drying which is much too slow to be considered for newspaper printing at modern high speeds.

Evaporating inks, which include gravure and heat-dry types, are being used extensively on high speed rotary presses for the printing of practically all of the better known weekly magazines. These same inks are used also on most of the large monthly magazines, and are being

(*) Abridgment of paper read before the Nineteenth Mechanical Conference, American Newspaper Publishers Association, Chicago, June 9, 10, 11, 1947.

printed on papers which vary in quality from newsprint and groundwood types to supercalendered and machine coated papers.

The most common method of drying these inks involves the use of gas heaters through which the printed web passes over a flame, so that the solvent in the ink is literally burned away, leaving the binding resin and pigment on the paper. Temperatures used are in excess of 1,000 Fahr. On other press applications the ink is dried by passing the web over large steam-heated drums.

Other applications use hot air chambers with a large volume of super-heated unsaturated air. Still other applications use a combination of these methods. All of these drying devices also involve the use of cooling rolls to chill the paper web back to normal. The possible use of high-frequency electric induction heating is being studied to determine if this method might be applicable but at the present time the size of the electrodes necessary to dry at modern speeds precludes their use on printing presses. This drying of ink by dielectric heating involves many other problems which need not be discussed at this time. It will be obvious that the application of any of these heating devices on a newspaper printing press might be impractical. However, experiments are being conducted by a large newspaper plant to determine if heat-set ink with drying equipment can be made more practical, especially for supplement printing on newsprint.

Experiments (with cold setting ink) conducted a few years ago in selected plants indicated a degree of success, but the cost of remodeling presses to provide for hot printing precluded their use in most applications.

Moisture-setting inks is the newest development. The approach to the improvement of inks for newspapers is now being made through supplement printing where more time is available for trial purposes.

This work is still in an advanced experimental stage and we are not yet prepared to offer these inks generally to the newspaper industry.

In addition to fast-drying, this ink does not have the progressive penetration characteristic of ordinary newspaper inks which often show a bleed through the paper, and also causes the paper to be more transparent because of the oil bleed. Since the moisture-setting inks do not dry by penetration, there is no bleed of solvents into the paper, which permits greater sharpness and better density in the printed result.

The apparatus for drying this ink consists of a device developed by us and for which patents are pending. The device impinges steam against the freshly printed web and is much less cumbersome than heat-drying devices, taking up very little space on a press unit.

It is a simple asbestos-lined metal box about four inches deep, ten inches wide and as long as the width of the paper web. The moving web forms a cover for the box. Inside the box are two steam pipes, each with a series of nozzles. Each nozzle sprays steam in a fan-shaped pattern. Inside each steam pipe is an electric immersion heater to superheat the steam and also to prevent condensation within the steam unit. The flow of steam is controlled by a solenoid valve connected into the electric motor drive so that steam is turned off automatically by means of a thermostat. Excessive steam is exhausted from the unit by small ducts connected with a suction fan. The recommended steam pressure is from 7 to 10 lb. Electric consumption of the heaters is 50 watts per inch of heater, which are only turned on intermittently.

We are encouraged by results with this moisture-setting type of ink on trials for newspaper supplement printing, and research in the ink industry is being conducted on other methods. However, it is unlikely that any miracle will occur to revolutionize the industry or cure it of all its ills over night, in a month, or even in a year. It is inevitable that the absorption type of news ink must be replaced by a different type of ink, but the ideal ink, for newspaper printing without drying equipment for the presses is still for the future.

The ink industry has in recent years


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A 1% solution of Magnus NX, applied through the showers at the beginning of a shut-down, prepares the felts for immediate and perfect functioning when the system is put in operation again, even where the shut-down is much longer than the usual week-end.

NX is a completely neutral, soapless material with unusual penetrating properties. It can also be used to break in new felts and for conditioning felts on or off the machine.

## You Need Not Pay For Clogged Suction Press Rolls

When the inner bronze part of a hole in a rubber-covered press roll is clogged with size, filler and other dirts, you can't tell from an inspection of the outside rubber section. Yet a badly clogged roll not only operates at poor efficiency, but tends to build up steam costs considerably. Magnus Suction Press Roll Cleaner will easily keep press rolls open and free from deposits, if used regularly for this purpose. It is speedy, effective and safe, having no harmful action on either the rubber or the metal of the roll. When you let clogging go too far, there's a slow, expensive job ahead of cleaning the holes one by one with drills or punches. Magnus Suction Press Roll Cleaner, used on a regular, planned schedule, keeps your press rolls at top efficiency all the time.

## If You Want A Freer Stock . . .

Magnus Beatex is a neutral synthetic wetting agent which consistently speeds and improves defibering and hydration, insures better formation, and makes possible materially increased retention of short fibers and fillers.

*On fruit wrap, Beatex offers marked improvement in softness, plus materially increased strength.*

Beatex is an excellent dispersing agent, and is particularly useful on stock containing a high amount of wax, ink and other foreign matter which tends to cause spotting and discoloration. Used in suitable proportions, Beatex can considerably improve absorbency.

Beatex does not affect the pH of the stock in any way. It is completely compatible with all furnishes, sizes and fillers.

It is generally used on Kraft and sulphite pulp and on stuffs with relatively high proportions of scrap, being particularly effective on board and roofing papers.

## Don't Tolerate Oil Sludge!

Magnus Clerex, used at the rate of only 4 drops per gallon of heavy fuel oil, will prevent sludge from forming. A slightly heavier concentration will disperse existing sludge deposits and make them burnable.

Magnus Chemical Co., 192 South Ave., Garwood, N. J. In Canada — Magnus Chemicals, Ltd., 4040 Rue Masson, Montreal 36, Que. Service representatives in principal cities.

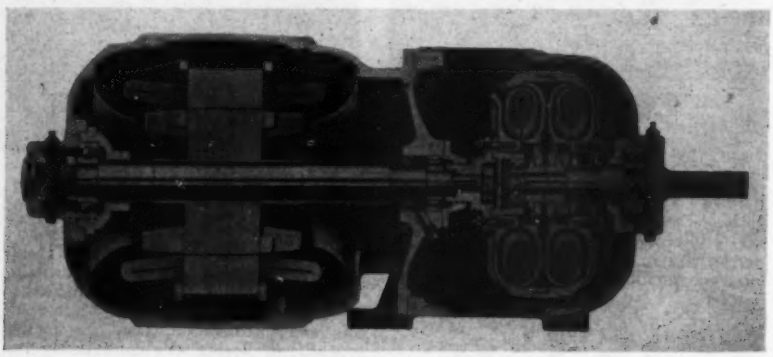
developed inks for many purposes which set by heat, moisture, wax, solidification, and preferential absorption. All this in addition to many improvements in the traditional methods of drying by oxidation and absorbency. These developments have made possible important advances in printing which were unheard of, or undreamed of, less than a quarter of a century ago. The ink industry is entitled to a certain amount of pride in these accomplishments and it is confident that the present problems concerned with newspaper printing will be overcome.

**Abridgments in this section are from papers presented at the Second Engineering Conference of the Technical Association of the Pulp and Paper Industry held in Philadelphia, November 3-5, 1947**

## The Electrofluid Drive

**FRED W. ATZ, JR.**
**Electrical Engineer**
**Link-Belt Company**

Hydraulic drives and couplings are classified into two general groups: constant and variable speed. These couplings are also known as fluid couplings, fluid drives, hydraulic drives and hydraulic clutches. Combining the fluid coupling with a standard general purpose motor becomes what is known as the Electrofluid Drive.



***A cross section of the Electrofluid Drive. Mounting dimensions meet N.E.M.A. requirements. The Electrofluid Drive is an integral unit***

The coupling is made of two main parts —runner and impeller. All are of the double circuit type (two runners and two impellers) except the one, and one and one-half horsepower sizes which are of the single circuit type (one runner and one impeller). The driver or motor end is called the impeller; the driven or load end is called the runner. No metallic connection exists between the runners and impellers. In the double circuit units, the two impellers are mechanically connected to function as a unit; likewise, the two runners are positively connected to function as a unit. The coupling is filled with a light mineral oil of steam-turbine quality. When the motor drives the impeller, it causes oil to flow through the runner buckets back to the impeller, thereby rotating the runner through the medium of the oil.

Primarily a constant speed unit, it is designed for 1800 rpm synchronous speed, 1730 rpm full load speed. However, it can also be used on 25 and 50 cycle alternating current, having full load input speeds of about 1450 rpm. At these speeds, the coupling operates at reduced rating, and in some cases oversize couplings must be used.

Acceleration, which is always of a smooth nature, depends on the inertia of the driven load—the greater the inertia, the longer the time of acceleration.

The motor and coupling are mounted as an integral unit, thus eliminating the base plate assures accurate and enduring alignment, plus compactness and economy.

When used with a mechanical variable speed device, the effect is similar to that obtained from a variable speed hydraulic coupling. However, the speed is more positive, regulation is infinite and the over-all efficiency is higher.

Large size fluid couplings adapt themselves more readily as independently mounted units, rather than integrally mounted. This method of design usually applies to 25 hp. and over.

The starting and protective equipment is standard, being of the across-the-line type of magnetic switch providing overload and under-voltage protection. It is the simplest form of equipment that can be used for remote control. The pre-set type of overload protection where the maximum torque, such as 150-200 or 250 per cent, to be transmitted can be predetermined, is accomplished by means of a pre-set instantaneous trip overload relay. This relay is out of circuit during the acceleration period during which time the thermal relay provides the protection. Where thermal elements provide the protection, overload peaks of short duration may occur. The motor through the fluid coupling absorbs these peaks until operation returns to normal.

The motor can be actually reversed from full speed forward to full speed reverse, by the mere pressing of the respective buttons. Quick accurate stopping can be effected by means of a plugging switch mounted on the driven shaft. Just before the driven equipment stops, the plugging switch opens the entire motor circuit. At this point, a solenoid brake can be applied, should it be necessary to hold the load.

Maintenance is reduced practically to zero. The main item being an occasional inspection of the oil level to insure maximum efficiency and protection.

There are many advantages inherent in this type of unit. The principal advantages are:

1. To eliminate shocks, impacts and torsional vibration
2. To insure continuous smooth operation
3. To maintain full torque at all output speeds
4. To permit the use of a motor closely rated to the developed load to be driven
5. To prevent stalling of the motor
6. To eliminate shear pins and other similar protective devices
7. To permit the use of a standard motor (a-c and d-c), eliminating the use of high torque, and high slip motors

The application of the Electrofluid Drive is widespread in the industry in general. However, in the papermaking industry its use has been limited due to the fact that it has not been exploited to any extent. It has been successfully applied to slitters and cutters and, due to its characteristics, lends itself to numerous applications in this particular field.

## Paper Mill Lubrication Dryer Bearing Circulation Systems

**A. I. SIPPOLA, Staff Engineer**
**Lubricating Department**
**Socony-Vacuum Oil Co., Inc.**

The original approach to the circulation method of lubricating paper machine dryer bearings were the ring, chain- and collar-oiled bearings. In this type of bearing a small quantity of oil is continuously fed to the journal by the ring, chain or collar, which dips in an oil supply contained in a reservoir below the bearing. After flowing through the bearing the oil drips back to the oil sump and is ready for re-use. Here we have a comparatively small volume of oil subjected to quite rapid recycling, and continuously exposed to the high temperatures typical of such installations and the ever present factor of contamination with paper fly.

In order to minimize the severe oil oxidizing influences in this type bearing, steps were taken to continually remove the oil from the heat zone. This made it possible to cool the oil, remove insoluble suspended contaminants and further cleanse it prior to reintroducing it to the bearing. With this arrangement the returning oil was introduced at the top of the journal, the oil sump level was maintained by an overflow through which the excess oil was removed, and the rings, chains or collars remained to function as before. The service conditions with this arrangement were not as severe as with the conventional ring-, chain- or collar-oiled bearing, but still it was impossible to completely renew the oil within the sump on each cycle. Thus, there still remained

the problem of subjecting part of the oil to rather lengthy periods of exposure to high temperatures.

By providing a more rapid rate of oil feed to each bearing, more oil was supplied by the circulation system than by the ring, chain or collar. This made it feasible to remove those devices and thus eliminate the so-called wet sump, which was the major problem. The oil could then be drained from the bottom of the housing, eliminating the overflow principle. This is known as a dry-sump bearing.

Along with this development, it became necessary to provide adequate bearing seals which had previously received little consideration. Many bearings had openings around the journal of approximately one-quarter of an inch through which a large quantity of oil could leak. Along with the problem of reducing oil leakage to the dryer heads, felts and probably the sheet, was that of preventing the entrance of foreign contamination. As the rate of oil feed was increased, a definite need for seals developed. This requirement has been met, and the plain sleeve bearing of today is provided with very effective seals.

In the case of antifriction bearings, which are finding wider application on paper machines dryers, the same development has taken place. Wet sumps have been practically eliminated on new designs, and rates of oil feed have been increased.

Today's paper machine plain sleeve bearing, when lubricated by a circulation system, begins to approach the steam turbine bearing which closely approaches the ideal.

When a new paper machine is erected, it is difficult to imagine an assembled unit without the presence of some contaminants within the oil circulation system. These may be either soluble or insoluble in the lubricating oil. The soluble materials may change the characteristics of the oil. The insolubles may be abrasive and lodge on bearing surfaces, causing excessive wear or possible failure.

All this means that the circulation system must be properly flushed out prior to operating the machine.

With increased rates of oil flow to the bearings, it has been necessary to enlarge the capacities of the oil tanks and filters. It is not uncommon to have paper-machine dryer-bearing circulation systems of 5000 to 8000 gal. oil capacities. The capacity is based on the number of oil outlets and rate of oil feed, and should provide sufficient oil to limit recirculation to once in one to two hours. This means that the resting time for the oil in the pre-settling and filter tanks will be from one to two hours. This is desirable to permit water and insoluble contaminants to settle out. The rate of settling will of course be improved if the tanks are arranged so as to minimize burbulence.

The builder anticipates the possibility of high humidity, steam or other moisture contamination in designing a system. There are two basic methods used to combat moisture:

(a) Proper venting of all trapped areas. For the oil tanks, a centrifugal exhaust blower is often connected to the tank covers. This type unit expels moisture vapors before they can condense on the exposed tank parts.

(b) Introduction of cool air (preferably outside air) to the circulation system in a volume sufficient to maintain a slight pressure within the system. This will continually expel air from the system and prevent entrance of moisture-laden air which surrounds an operating paper machine.

As improvements were made in machine-design elements, and conditions promoting oil deterioration were minimized, it became apparent that the useful life of an oil could accordingly be increased. In general this resulted in extending use of the oil beyond its real life, and again, in combination with severe operating conditions, oil oxidation occurred and deposits were encountered.

In some instances, operators made a practice of draining, flushing and cleaning dryer-bearing circulation systems at intervals frequent enough to minimize oil deterioration and prevent deposit build-up. In sections of the country where high humidity conditions prevail, this had an adverse effect on the ultimate results. While the oil itself was always in excellent condition, and thus the formation of deposits due to oil oxidation were minimized, there was little in the oil to resist a tendency toward rusting which occurred even on those surfaces that were oil-wet. Thus, by improving one condition, another, which could be very serious, was created. It then became necessary to provide a lubricating oil which would have high resistance to the severe oxidizing influences of such a system, and at the same time minimize the tendency toward rusting. This problem was particularly serious when antifriction dryer bearings were in service.

The oils that are now offered for paper-machine dryer-bearing circulation systems possess very high chemical stability and minimize the conditions of rusting which had prevailed in the areas of high humidity. One of the problems encountered in the formulation of this type of oil was that of maintaining the ability of the oil to readily separate from water that entered the system. While the new type of oil will not separate from water quite as readily as the former straight mineral oils when new, they will retain this separating ability for much longer periods. The use of proper inhibitors minimizes the formation of those products which cause oils to form emulsions.

Many machines have the oil piping so arranged that it passes through a series of two or more bearings before being returned to the oil storage tank. This means that the oil is first introduced to a top dryer bearing, from where it either drains or overflows directly to a bottom dryer bearing. If three banks of dryers are employed, this oil would then be used in three dryer bearings. By so doing, the oil temperature is elevated in the first bear-

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ing, introduced to the next bearing at this elevated temperature and then either returned to storage or to a third dryer where its temperature is further increased. It can readily be seen that the oil is subjected to very severe oxidizing influences because of its progressive increase in temperature.

In addition to the oxidizing influence of high temperature, the second and third bearing in the series is dependent upon oil leaving the first bearing for its lubrication. If the drain line from the first bearing becomes plugged, the second and third bearings are then starved of oil.

Often the oil-return lines from the bearings are too small, and do not allow rapid enough return by gravity to permit the desired amount of oil feed to the journal. In line with this, some systems are so erected that the sight-feed oil regulators are placed from four to ten feet ahead of the bearings. The oil fed by pressure through the sight-feed oiler needle valve flows by gravity from the oiler to the bearing. When this piping is too small in diameter, the desired amount of oil cannot be supplied to the bearing because of the limitation of gravity flow. Sometimes, in order to supply sufficient oil even its viscosity may have to be reduced below that desired and since the feeds must be restricted, bearing wear may be accelerated.

On practically all older-type systems the overhead gravity oil-flow tank has been utilized. The main objection to such a method is that a comparatively low pressure is realized at the needle valves of the sight-feed oilers. Any contamination which may have been carried through with the oil to this point will then have a greater tendency to cause plugging at the valves and decrease or stop the oil flow to the bearing.

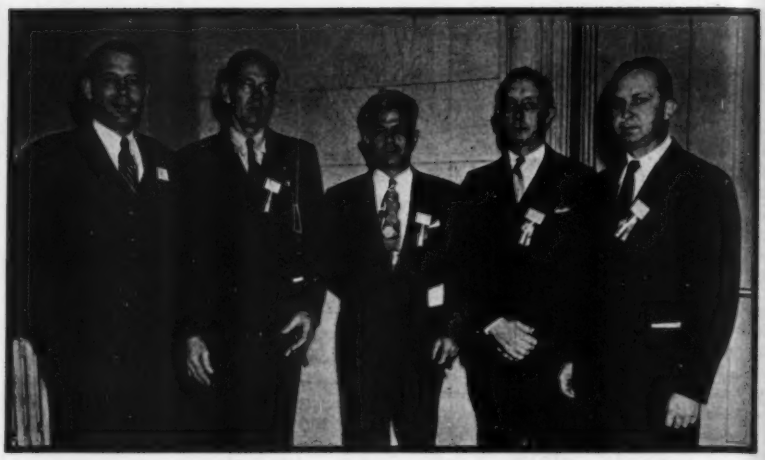
Many oil settling or storage tanks are equipped with steam coils for heating the oil. This may be done to lower the oil viscosity for easier filtration, to obtain more rapid separation of insoluble contamination, or to provide a low-enough oil viscosity to be properly handled in the delivery system to the bearings. Often proper control of these heating coils is not exercised, with the result that the oil surrounding the coils, which may have a temperature of 240 Fahr., is oxidized or actually stewed down. Where steam coils are employed today, thermostatic controls regulate the steam flow so that the coils are filled with condensate instead of live steam. In this way, the oil surrounding the coils is not continuously subjected to high local temperatures.

As mentioned earlier, we have systems today which hold from 5000 to 8000 gal. of oil. This is necessary because each individual point of oil application receives its supply from the main header. Moreover, the number of points of application has been greatly increased, and thus the rate of oil flow is much higher. The sight-feed oilers are generally located very close to the point of application, whether it be a bearing or a dryer gear. When it becomes necessary to set the oiler several feet from the point of application, the delivery line is of sufficient size to permit the proper oil flow by gravity to the point of application.

The bearings are generally of the dry-sump type. The returns provided from the bearing housings and the gear cases, if the latter are involved, are of ample size to drain off a large quantity of oil without backing up and leaking through the housing seals.

Felt seals have been used on bearing housings until very recently. Because they lose their resilience and have to be renewed if the bearing housing is taken apart, the builders are not providing quite effective housing seals that depend on a close fit between the journal and housing with serrated sections, and sometimes oil flingers.

With the present-day design of bearings, housings, and circulation system, along with the improved lubricating oils, it would seem that no trouble is to be anticipated. The oil itself, after years of service, may be in excellent condition as regards its physical characteristics, determined by laboratory analysis. However, this does not mean that the system itself is free of contamination or rust. In order to know the actual condition, it is necessary to periodically inspect several bearings selected at random, and to inspect the gears if they are included as a part of this system. In addition, it is well to know whether or not deposits have collected in the return lines, and this can only be determined by breaking several joints and making an inspection.



***CORRECTION:** The legend which appeared under this picture (cf. report of TAPPI meeting in Asheville, November, 1947, p. 1168) was erroneously worded. The gentlemen should have been named right to left—not left to right. Shown left to right in the illustration are: Ward D. Harrison, assistant manager, Ecusta Paper Corp, Pisgah Forest, N. C.; Raymond F. Bennett, president of the American Pulp and Paper Mill Superintendents Association and general superintendent of Ecusta Paper Corp.; W. F. Gillespie, president of TAPPI, and technical director, Gaylord Container Corp., Bogalusa, La.; Fred V. Doutt, chief chemist, Champion Paper & Fibre Co., Canton, N. C.; and K. G. Chesley, chairman of Alkali Pulping Committee of TAPPI, and director of research, Crossett Lumber Co., Crossett, Ark.*

## A Fuel Engineering Study of Some Recent Boiler Installations in the Pulp and Paper Industry

**J. E. TOBEY, Director**
**Fairmont Coal Bureau**

Like the electric utilities industry and others, the pulp and paper industry is progressive in purchasing boiler units of conservative design. The author has made a study of 65 postwar installations in the pulp and paper industry located in 12 Northeastern and Great Lakes states and Canada, all of which are designed to burn a wide range of coals. It is believed that their number represents most, or at least a large portion, of complete boiler units purchased by the industry in this area since the end of the war.

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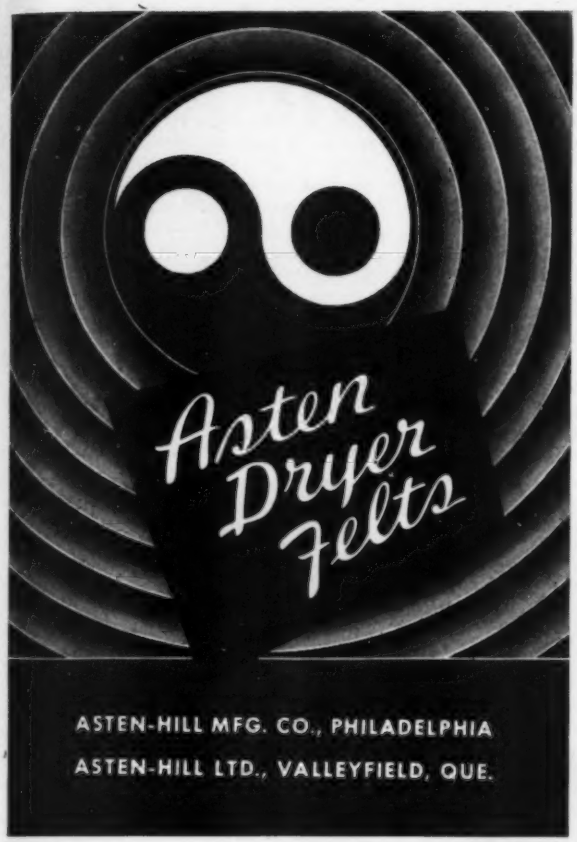


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The 65 units are designed with sufficient flexibility to provide for the use of practically all coals which may be supplied in their geographic location under both normal and emergency conditions. The capacities of units range from 200,000 down to 6,000 lb. of steam per hour. The total steam-generating capacity is 5,598,000 lb. of steam per hour, representing an average of 86,123 lb. per unit. It is estimated that the total annual bituminous coal consumption will be on the order of 2,101,218 tons.

By types of firing and average capacities, the units are as follows:

| | No. of Units | Average Capacity lb. of Steam per hr. |
|---|---|---|
| Pulverizers ..... | 29 | 108,448 |
| Spreader Stokers .. | 25 | 62,960 |
| Underfeed Stokers | 9 | 78,778 |
| Traveling- and Chain-Grate Stokers ..... | 2 | 85,000 |

Steam pressures ranged from 150 to 925 psi, the average being 468 psi, and steam temperatures ranged from 365 to 825 Fahr., averaging 629 Fahr. Design boiler and furnace efficiencies ranged from 76.4 to 87.5 per cent, averaging 84.0 per cent.

Data collected on the installations show the following values for all types of firing. Btu range (as fired basis—10,400 to 14,440; average 12,919. Maximum moisture 3.00 to 15.63 per cent; average 6.78 per cent (represents 57 per cent of total units). Maximum ash—4.80 to 17.00 per cent; average 8.17 per cent (represents 57 per cent of total units). Maximum sulphur 0.81 to 5.87 per cent; average 2.15 per cent (represents 43 per cent of total units). Minimum ash-softening temperature—1900 to 2400 Fahr; average 2063 Fahr. Grindability (Hardgrove) 50 to 65; average 56.

The modern boiler unit is an automatic energy converter, a mass production unit in which the flow of fuel into the furnace and the flow of steam and waste products out of it are streamlined and synchronized. Manual operating labor is eliminated and the process is continuous. If the complete unit, including its conveying systems, is conservatively designed, it will stay on the line for long periods and not be sensitive to changes in coal quality and physical characteristics within the design limits.

As postwar conditions become more stabilized, coal quality will improve materially over average wartime quality. However, the author does not expect the quality of raw coal to average quite as high as prewar. On the other hand, an increasing tonnage of high-quality coal will be available from cleaning plants.

It is generally uneconomical both to the producer and consumer to remove from steam coals a small percentage of ash, say 2 per cent as from 10 to 8 per cent, whereas, it may be highly worthwhile to remove 8 per cent from a 16 per cent-ash coal. This statement is, of course, oversimplified for the problem is complex, involving freight rates, moisture content and other variables.

The author believes that from now on 8 to 10 per cent ash will represent high quality steam coals in many areas, including the eastern seaboard.

The pulp and paper industry is undergoing rapid expansion and in no industry is fuel a more important item. The industry is going to burn progressively more coal and the matter of steady year-round supply under both normal and abnormal conditions is becoming increasingly important. Never before has it been so important for buyers to carefully study the long-range fuel requirements of the mills and to figure out which coal fields can best and most economically meet these long-range requirements. Large mills should, by one of several means, attach themselves to large coal reserves through substantial producers. Here the author is not necessarily referring to long-term contracts, although he believes there will be an increasing amount of this type of business, but rather to plans in which the buyer would work more closely with fewer sources and with some mutual assurances in regard to continuity.

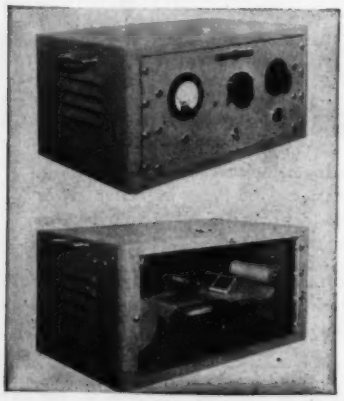
It is not good for mills which burn substantial tonnages year in and year out to figuratively worry about where their next "fuel meal" is coming from and by the same token it is not good for producers with large reserves to constantly worry about customer turnover.

There is a more sensible approach.

# NEW EQUIPMENT AND SUPPLIES

## Flaw Detector for Thin Sheet Materials

A flaw detector for the continuous detection and counting of holes, weak spots and conducting paths in thin sheet materials, such as paper, sheet rubber, plastic materials, etc., has been announced by the Special Products Division, General Electric Company, Schnectady, N. Y. The device consists of an electrode assembly through which an adjustable voltage is applied to the material undergoing test, and an electronic circuit which indicates the flow of current through the material which occurs when a flaw passes under the electrode Electrodes have been especially designed for use with specific materials.



The detector can be made to sound an alarm, operate a recorder, or shut down the manufacturing process when flaws are encountered. It can be arranged to indicate when flaws exceed a given total. The control unit may be mounted remotely, where an operator can read the counter or watch for flashes of a flaw-indicating red light.

Application can be made to sheet materials up to .025 in. thick moving as fast as 450 fpm.

## Electric Impact Tool

An electric impact tool, designated as Size 4U, has been announced by Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. Weighing 6½ lb, the tool has an

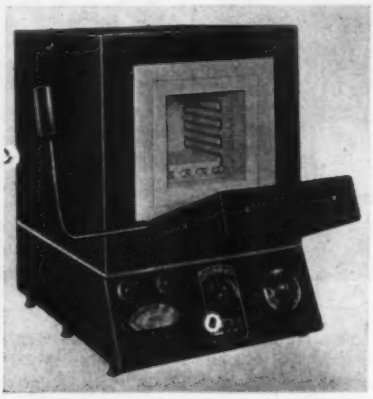
over-all length of 10½ in., a free speed of 2000 rpm, and delivers 1900 rotary impacts per minute under load. It is powered with a reversible 3-amp electric motor that operates on 110 volt, ac-dc current.

The tool runs just as any conventional electric tool until the resistance to spindle rotation reaches a certain point. Then a patented mechanism converts the power of the motor into "rotary impacts."

The manufacturer suggests the tool for the following operations (using standard attachments): apply and remove nuts, drill, ream, tap, drive and remove screws, drive and remove studs, extract broken cap screws and studs, run wire brushes, woodboring, and drill brick and masonry.

## Laboratory Furnace

A medium-size laboratory furnace, termed the *Model 9A De Luxe*, with built-in automatic temperature controls, has been developed by K. H. Huppert Co., 6830 Cottage Grove Avenue, Chicago 37, Ill. The over-all dimensions of



the furnace are 19 in. by 20½ in. by 21¼ in.; inside dimensions, 6 in. by 6 in. by 6 in., with a 3¼ in. throat additional.

The furnace itself is made of heavy gauge steel, with multi-layered insulation, and finished in black wrinkle enamel. The heating unit is constructed of heavy gauge special alloy wire.

The furnace is designed to maintain automatically any desired temperature between 250 and 1900 Fahr. It reaches a maximum of 2000 Fahr.

The heating unit consumes 2000 watts at 110 volts (a-c only).

## Pipe Fitting Machine

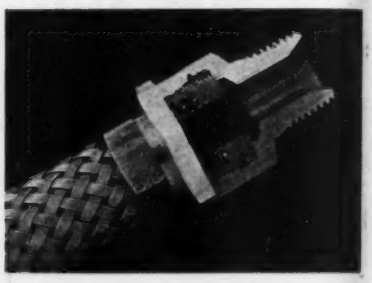
American Die & Tool Co., 504 Second St., Reading, Pa., has announced a portable power pipe threading machine, the 1948 model *Red-E-Haul*, designed especially for installation and maintenance of all piping from ⅛ in. to 2 in. in size. This range can be extended to all sizes from ⅛ in. to 12 in. by use of simple auxiliary equipment.

With this machine, it is possible to cut, chamfer, ream and thread any pipe from ⅛ in. to 2 in. without changing dies. A flip of a lever selects the size instantly.

The new model features a built-in tool tray and handy dope cup. The switch for the 1 hp motor incorporates a double electric outlet for lights and small power tools. Built-in safety features for the protection of both operator and machine include chuck, wrench ejector, electrical overload protection and automatic power pump coolant system. An automatic stop opens the dies after standard length pipe threads are cut. However, any length thread may be cut.

## Seamless Flexible Metal Hose

The Brockway Co., Naugatuck, Conn., has announced a helically-corrugated, seamless flexible metal hose (*Uniflex*) that is made of a special alloy seamless bronze tube. The hose is encased in a bronze wire braid sheath. Couplings are attached



to the sheath to relieve the hose of damaging strains. Each fitting provides a metal-to-metal seat by means of a seal produced between the fitting body and the spring washer effect of the hose itself. Once the fitting is assembled it remains leakproof.

## Pneumatic Tired Fork Truck

Clark Tructractor, Battle Creek, Mich., has announced a pneumatic tired fork lift truck of 4000-lb. capacity at 24 in. Designated as *Yardlift-40*, the truck has been designed for working outdoors or on surfaces too uneven for solid tired machines. It has a total lift of 125 in. with

85½ in. over-all height. A heavy-duty transmission provides speed of 9.4 mph in high and 2.9 mph in low, both forward and reverse. Minimum under clearance with the truck empty is 5¼ in. under the center of the drive axle.

## Recording Rotameter with Electronic Control

Schutte & Koerting Company, 12th and Thompson St., Philadelphia 22, Pa., has announced the development of a recording

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**WRITE FOR LITERATURE**

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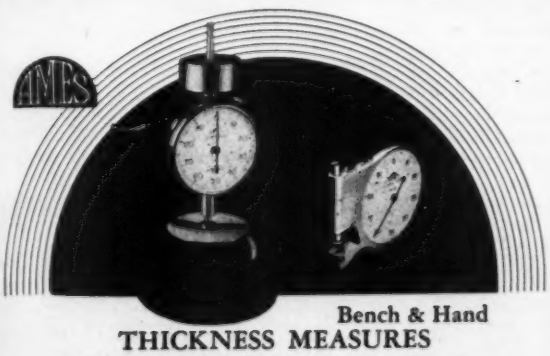


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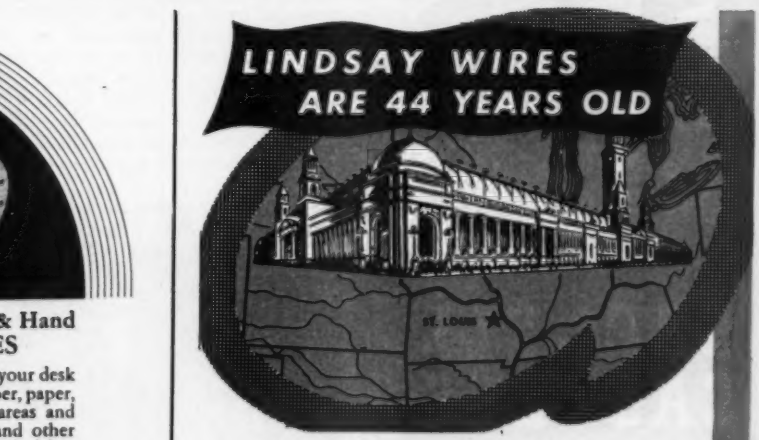


*On April 30, 1903*
*the Louisiana Purchase Exposition buildings were dedicated in St. Louis with impressive ceremonies.*

• Two out of every three business failures occur in the first three years. By contrast, industrial expositions are frequent reminders of the fact that organizations 100 and even 44 years of age are invariably noted for excellence of product. They have to be. Their customers see to that. The manufacture of Fourdrinier wire cloth is no exception to this rule.

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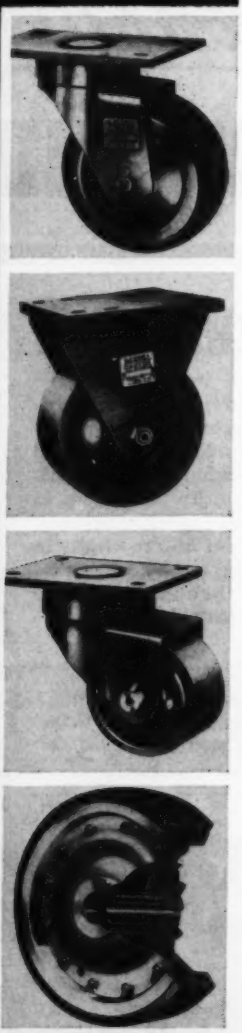

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rotameter with which is combined a Foxboro electronic Dynalog (Reg. U. S. Patent Office, Foxboro Company) recorder. Instantaneous response to change of flow, continuous balance, rugged power, continuous connections, unit construction using four principal assemblies, direct linkage with no gears, positive linear motion, long life and elimination of over-travel are listed by the manufacturer as features of the system.

### Corrosion Inhibitor for Ferrous Metals

Bee Chemical Co., 63 E. Lake St., Chicago 1, Ill., has developed a water displacing corrosion inhibitor, *Steelyfe* 11, for steel and other ferrous metals in indoor storage. This product has as its active ingredient the barium salt of an alicyclic sulphonic acid. It is a thin, dark liquid having a flashpoint of about 105 Fahr. Application can be by dipping, brushing or spraying, the coating thus produced following evaporation, being soft, transparent, and readily removable by wiping or with de-greasers even after standing for several years.

For most indoor protection jobs, one part of Steelyfe 11 is added to six to twelve parts of Stoddard Solvent. The product can be furnished in dilution ready for use.

### Portable Power Conveyor System

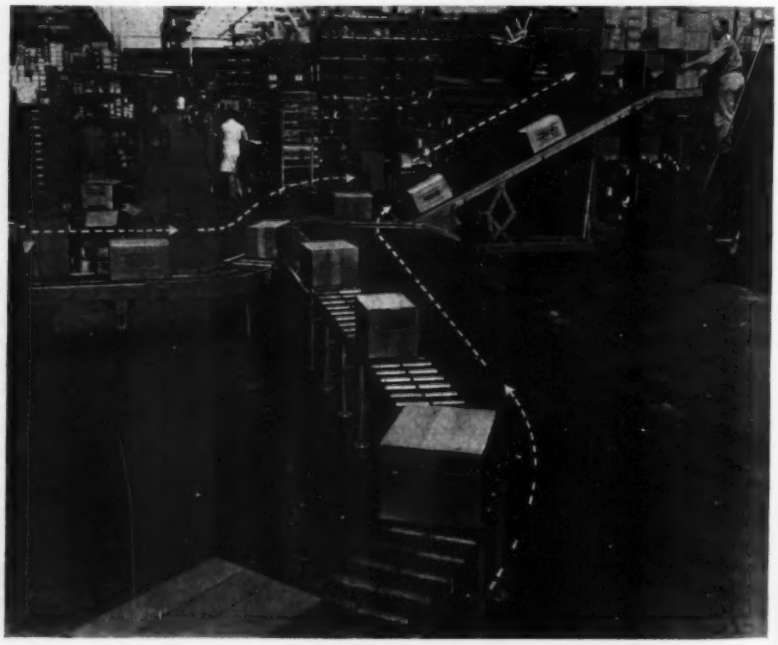
A portable power conveyor system for loads up to 100 pounds per foot has been announced by the Food Machinery Corp., Riverside, Calif. Designated as the *FMC Unitized Portable Power Conveyor System*, the system is built around a basic power unit made up of a standard 10 foot straight section powered by a ½-hp. motor. In combination with this unit are such accessories as 90 degree power turns, automatic power conveyor intersection, piling conveyor base, power feed attachment, and gravity take off attachment—also the accordion type of gravity conveyor.

For the simple job of loading or unloading a truck, the portable unit is assembled as a stacking or piling conveyor. For more complicated problems, all units can be combined into a network of conveyors—each of the branch units feeding into one main line.

### Slewing Boom Attachment for Fork Truck

Automatic Transportation Co., 149 West 87th St, Chicago 20, Ill., has announced an interchangeable motorized

slewing boom attachment for fork truck mounting. The boom, mounted on a standard 6000-pound capacity Automatic fork truck chassis, will handle 1100-lb. loads at maximum outreach of 108 in.



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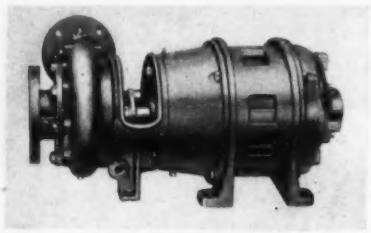
and 1820 lb. when in closed position of 54 in.

The boom is operated by a single reduction slow-speed worm gear unit. Push button controls are mounted on rear uprights within easy reach of the operator. Quickly detachable, the boom may be replaced by standard fork, gooseneck crane, motorized fork carriage, ram, or other similar attachments for standard or specialized handling operations.

## New Line of Centrifugal Pumps

Goulds Pumps, Inc., Seneca Falls, N. Y., has announced a new line of *Close-Cupld* centrifugal pumps.

Among the features of a pump of this line, in which pump and motor are combined on a single compact assembly ready to install and operate in any position except vertically with motor below pump, are the following: a machined stuffing box which permits the use either of a die-formed, semi-metallic packing with lantern type liquid seal ring or a mechanical seal; a full length shaft sleeve which protects the main motor and pump shaft against liquid damage (sleeve can be removed easily when necessary—also provision is made for expansion and contraction of the sleeve to prevent buckling and dis-



tortion); liquid deflector, mounted on end of shaft sleeve, is drilled and tapped so that in servicing a pump, a spanner can be used to prevent shaft rotation while tightening or removing impeller nut—also, with the use of puller studs, to remove shaft sleeve; and a split gland, with the halves held together with hollow washers which slip over bosses on the gland, make it unnecessary to unbolt gland halves when repacking stuffing box.

The line covers a range of 17 sizes with capacities up to 2000 gpm and heads up to 400 ft. depending on capacities.

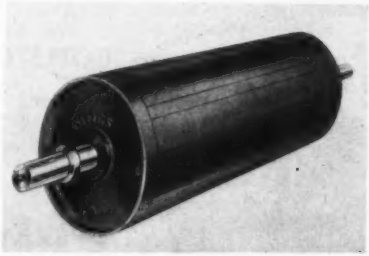
## Safety Stickers

The Howard Co., 15811 Denker Ave., Gardena, Cal., has announced a line of 2-in. by 4-in. self-sticking safety stickers.

These stickers, known as *Safe-T-Stikrs*, are colored and worded like a miniature billboard. They are easy to press in place; and easy to peel off clean when they have served their purpose.

## Magnetic Pulley

Dings Magnetic Separator Co., Milwaukee, Wis., has announced the *Perma-Pulley* as a new permanent magnetic pulley with Alnico poles. Available in 53 sizes ranging from 12-in. diameter by 12-in. width to 30-in. diameter by 60-in.



width, the pulley is designed for use as a head pulley in a belt conveyor system or in a self-contained magnetic pulley-type separator unit. (Being of permanent magnet construction, no electrical wiring is required. The manufacturer guarantees the magnetic permanence forever provided the magnet is properly used.)

The pulley has a crown face to prevent belt weaving and to aid in even distribution of the burden across the belt as it passes over the pulley. Shaft diameters are standard to permit replacement of non-magnetic head pulleys in existing installations without changing bearings or shaft mountings. Head plates of the pulley are non-magnetic to prevent collection of magnetic material on the outside edges. A narrow gap design is used with non-magnetic gap plates between the poles and equal magnetic strength across the full width of the belt.

## Line of Gate Valves Reinstated

Crane Co., 836 S. Michigan Ave., Chicago, Ill., has announced the reinstatement of its line of Ni-Resist cast iron gate valves, which was discontinued prior to World War II.

The valves are of the wedge disc, outside screw and yoke type and are being regularly furnished with screwed ends in sizes from ½- to 2-in. and with flanged ends in sizes from 1- to 8-in. All valves in sizes 3-in. and smaller have the clamp bolted bonnet, and sizes 4- to 8-in., inclusive, have the conventional type of bolted bonnet.

Body and bonnet of all valves, the disc in sizes 4-in. and larger, and the gland in sizes 3-in. and smaller are made of Ni-Resist. The strength and physical characteristics of Ni-Resist are about the same as those of cast iron. Its resistance to erosion and wear, however, is superior to cast iron, as is its corrosion resistance.

To add to the corrosion resistance of these valves, the stem and body seat rings, the disc in sizes 3-in. and smaller, and the disc facings in sizes 4-in. and larger are made of 18-8 alloy steel.

This line of valve, according to the manufacturer, is especially suitable for soda and sulphate pulp mill service.

## Non-Staining Packing

Quaker Rubber Corp., Comly and Milnor Sts., Philadelphia 24, Pa., has announced a packing for stock pump, jordan, and other pulp and paper stock handling and processing equipment service, which, according to the announcement, won't stain or spoil paper stock—yet effectively resists leakage even under constant pressure and friction. Made of high quality rayon roving and impregnated with a special lubricant, the packing, designated as *Quaker Rayon No. 1680*, is available in spools in sizes from ¼ in. to 1 in. in diameter, with sizes advancing by 1/16 in.

## Electrode for Hard-Surfacing Applications

General Electric Co. (Electric Welding Division), Schenectady, N. Y., has announced a new electrode for hard-surfacing applications. Designated as Type W-94, the electrode will work harden to over 50 Rockwell C. It operates on a-c or d-c reverse polarity.

Packaged in 50 lb. standard packages, W-94 is available in 14 in. lengths, with diameters of ¼, 3/16, 5/32 and ⅛ in.

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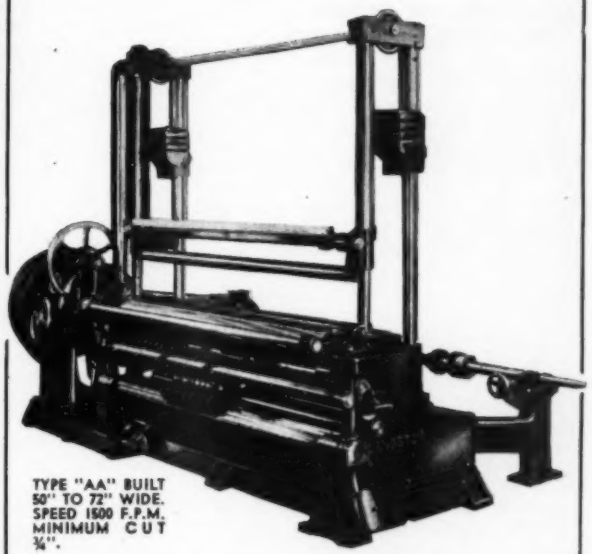

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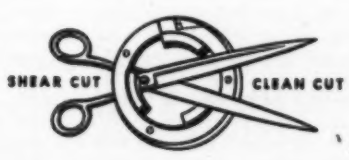

# TECHNICAL DEVELOPMENTS

**These abstracts are of the latest developments found in the American and foreign press.**

## Pulp Yield and Quality as Affected by Chip Thickness

The effect of chip thickness on the yield and quality of sulphate pulps from pine and sulphite pulps from spruce was studied by carefully cutting the chips as rectangular parallelopipeds 35 mm., long, 25 mm. wide, 0.5 to 5 mm. thick for sulphite and 0.5 to 7 mm. thick for sulphate cooks. The chips were cooked to three different degrees by both processes. Narrow and wide-ringed spruce were used for the sulphite cooks and pure heartwood and sapwood for the sulphate cooks. In all cases, both yield and quality of the pulp varied with the thickness of the chips, with sharp maxima at about 3 mm. chip thickness. Very thin chips gave the poorest pulps. It is suggested that the characteristics of mill chipping equipment may be tested by comparing properties of pulps made from mill chipped wood and hand cut chips 3 mm. thick. Albert Backman. *Finnish Paper Timber J.* 28, 200-208 (1946) (Through Chemical Abstracts 41, 5716, 1947).

## Glyoxal

The largest use of glyoxal at present is in the Sanforset process for shrinkproofing of rayon. However, increased commercial production of this very interesting dialdehyde is opening up possibilities for many new uses. Among those described in this article is the use of glyoxal in improving the wet strength of paper. Glyoxal applied by itself to paper tends to render the sheet brittle, so it is mixed with hydroxyethylcellulose (Cellosize) prior to application to the sheet. One treatment of a high grade paper toweling increased the wet strength 144% over the untreated paper. In addition, the absorbency was increased over six times. Paper sized with hydroxyethylcellulose, glycerin, and glyoxal coating is resistant to most solvents, lubricating oils, printing inks, etc. J. A. Field. *Chemical Industries* 60, No. 6, 960-963 (June 1947).

## Absorption Spectra of Cellulose

Studies have been made of the ultraviolet and infrared absorption spectra of cellulose acetate and regenerated cellulose before and after oxidation with nitrogen dioxide and of the regenerated cellulose after oxidation with periodic acid followed by chlorous acid. The materials were prepared for study by casting thin (2.8 to 4.1 microns) films of the cellulose acetate in acetone solution. The regenerated cellulose was prepared by deacetylation of the acetate film. The ultraviolet spectra were obtained over a wavelength range of 210 to 410 millimicrons, the infrared from 2 to 15 microns. The ultraviolet curves were less interesting than the infrared. From the infrared spectra, characteristic absorption bands were located for hydroxyl, carbonyl, carboxyl, carbon-hydrogen, carbon-oxygen and possibly aldehydic linkages. The possibilities of using the infrared spectra for analytical purposes in following changes in cellulose are discussed. John W. Rowen, Charles M. Hunt, and Earle K. Plyler, Journal of Research of the National Bureau of Standards 39, No. 2, 133-140 (1947) (Research Paper RP1816).

## Elasticity and Flow in Paper

In the first part of this long article the author discusses the fundamental elastic and flow properties of materials in general and of paper in particular. An elastic body may follow Hooke's law (strain proportional to stress) and a fluid body may follow Newton's law (rate of flow proportional to shear). Paper exhibits both elastic and flow properties and for this reason, the author speaks of paper as a visco-elastic body. An outline of the author's nomenclature follows: The initial, immediate strain exhibited when a body is placed under stress is called *instantaneous deformation*. If the body is permitted to remain under stress, a flow phenomenon of further strain may take place, called *primary creep*. If the cause of strain is removed, an immediate, elastic recovery is first evidenced, followed by a slow flow recovery, *creep recovery*. The creep recovery will not, however, carry the body back to its original dimensions. The difference between the two lengths is called *permanent set*. If a body under stress is held at a given strain, it is found that the force necessary to maintain the elongation decreases with time. This phenomenon is termed *relaxation of stress* and is considered by the author to be a very important property of paper. If a material is subjected to loading and unloading cycles, the change in permanent set becomes less and less with each cycle, until the body is *strain hardened*. After a mathematical analysis of the terms defined above, a short description is given of an instrument designed to demonstrate these effects on paper. The instrument is of the chain-balance, photoelectric recording type, capable of operation over wide ranges of either constant rate of loading or at constant rate of strain.

It was indicated that a complete, detailed description of this instrument would be given in a later paper. Using this instrument, stress-strain curves were obtained for paper demonstrating the dependency of these curves on direction of strip (machine or cross), on relative humidity, sizing, etc. It was also shown conclusively that the shape of the curve depends on testing conditions, that the ultimate strength may vary widely, depending on the rate of loading and that reproducible, characteristic curves for paper may be obtained. Variations in tensile strength of fourdrinier paper in and across the machine are partly ascribable to fiber orientation, partly to the tensions on the sheet during drying. Variations in the cross-direction tensile strength of strips cut from different parts of the reel across the machine are caused by tensions developed in the cross direction of the sheet during drying. Thus a strip cut 10 cm. from the edge had a tensile of 2.3 kg., and one cut 110 cm. from the edge had a tensile of 2.9 kg. The creep of paper is important in the application of stiffness or bending tests and may render invalid the application of elasticity formulae based on Hooke's law. The fact that Boltzmann's principle largely obtains for paper leads to the observation that paper is a body of essentially the same structure as other materials such as viscose fibers, glass threads, rubber, etc. Börje Steenberg, *Svensk Papperstidn.* 50, No. 6, 127-140 (1947) (In English).

The second paper of this series, which evidently will consist of several more publications, is probably of more interest to papermakers than the first, inasmuch as it is concerned with the practical importance of the properties previously discussed with particular reference to *relaxation of stress*. The property of relaxation under stress is considered to be of more actual importance than breaking length in many instances. A good wallpaper, for example, should be capable of stretching to conform to a slowly sagging wall without setting up undue stresses. The rate of relaxation may be low, but there must be some capacity for relaxation of stresses. On the other hand, printing papers and bag papers, which are likely to be subjected to sudden stresses, must possess a high rate of relaxation. In these uses, a paper with a short relaxation time and low ultimate tensile strength may show very much greater service strength than one with high tensile strength and low rate of relaxation. Creping of paper lowers the tensile strength, but greatly increases the relaxation rate, and in many cases a creped paper gives better service than the same paper uncreped. Increased rates of relaxation may be achieved in several ways on the paper machine. The paper should be stretched as little as necessary in drying, calendering and winding. Slitting of the sheet at the dryers instead of at the reel helps to break up the cross-direction tensions set up, reduces the strain-hardening and increases the relaxation rate. All of these measures tend to increase what the author terms *microcreping*. Measurement of the capacity of paper to relax stresses when under strain may be carried out in several ways, the most direct being to deform the paper and study the rate of relaxation of stress with an instrument such as the author used. A second method is to study the damping of paper oscillations. Extensibility, *i.e.*, elongation at rupture, is a rough measure of relaxation rate. Improvement of the accuracy of extensibility attachments on commercial tensile testers would probably lead to obtaining of much useful information. *Ibid*, 50, No. 15, 346-350 (1947).

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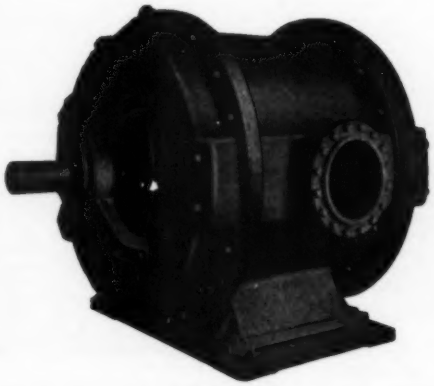

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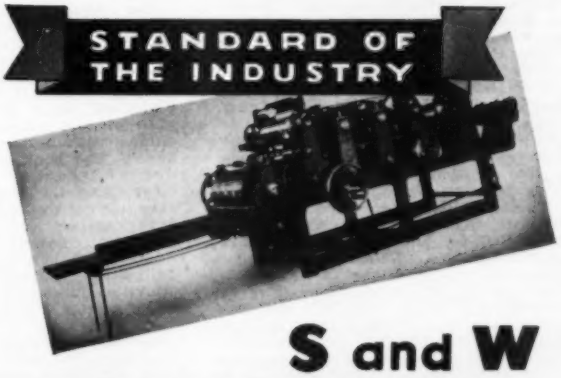

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# New Catalogues and Publications

**Allis-Chalmers Mfg. Co.,** Milwaukee 1, Wis. — An attractively illustrated eight-page bulletin issued by this company is descriptive of their automatic self-priming pump, with new type automatic spring valve. This pump, which is adaptable to any drive, is available in five sizes. Ask for Bulletin No. 086319B.

**Clark Tructractor Division, Clark Equipment Co.,** Battle Creek, Mich.—The current number of Material Handling News, a picture magazine of modern material handling, published by this company, shows how special attachments increase the usefulness of fork trucks. Of particular interest is a revolving scoop for handling rolls of paper.

**DeLaval Steam Turbine Co.,** Trenton 2, N. J.—Now available from this company is their Worm Gearing Bulletin, which describes and illustrates the advances of worm gearing. Much useful information is given in the book, including AGMA service classifications, selection practice, horsepower ratings, worm thread and gear tooth data for different ratios; dimensions and details of standard worm mountings, worm dimensions, gear dimensions and dimensions of standard flanged rims. Ask for Bulletin WG 1220-5-46.

**The Dow Chemical Co.,** Midland, Mich.—Just published are two booklets on Ethocel. The "Ethocel Data Handbook" contains information on the basic properties of Ethocel, and suggestions for its use in lacquers, emulsions and hot melts. The other, "Recording Lacquers of Ethocel" is the first of a series of monthly bulletins on specialty coating applications. Copies may be obtained from any Dow office, or by writing to Coatings Section, Plastics Division, The Dow Chemical Co., Midland, Mich.

**Fairbanks, Morse & Co.,** 600 S. Michigan Avenue, Chicago—Now available from this company is a bulletin describing the features of their new Axial Air Gap Motor, and illustrating various applications. Write for Bulletin 2760.

**Foxboro Co.,** Foxboro, Mass.—A new edition of their 38-page bulletin "Pneumatic Control Valves and Controller Accessories" has been issued by this company. The bulletin includes the following features—a color page showing the various identifying enamel finishes offered on Stabilflo valves, corresponding with the color code of the American Standards Association; plates and tables of specifications for control valves, needle type valves, poppet valve and butterfly valves; separate sections on the Vernier Valvactor for high accuracy positioning of valve plungers, and on air switches and sub-panels for remote valve control. Also included is information on computing of valve sizes, with tables and formulas. Air filter sets, ventilating dampers and other accessories are illustrated and described. Ask for Bulletin 277-2.

**The B. F. Goodrich Co.,** Akron, O.—New catalogue sections issued by this company include Section 12040, descriptive of industrial rubber footwear; Section 12035, carbon dioxide fire extinguishers; and Section 5000, superheat compressed asbestos sheet packings, which are suitable for packing against saturated and superheated steam, air, oils, acids, most chemical solutions, etc. Copies are available on request.

**The B. F. Goodrich Chemical Co.,** Rose Bldg., Cleveland 15, O.—This company has issued a new technical service bulletin, No. 47-H1, on Hycar American rubber latices, which are used in the paper industry for saturation, impregnation and coating applications. The bulletin may be had from the above address.

**Hercules Powder Co.,** Wilmington, Del.—A new technical booklet issued by this company includes a description of the properties and uses of all Hercules Powder Co.'s synthetic resins. A chart which matches resins with their actual and potential uses is an important feature, and will be of special interest to paper manufacturers.

**Nopco Chemical Co.,** Harrison, N. J.—Just released is a new edition of the informative 40-page booklet obtainable from this company, entitled "Interpretation of Analysis for the Layman." Included is a cross-reference glossary of terms used in analyzing surface active chemicals, also a chapter describing the common methods of analyzing such agents, and the use of the analytical figures to deduce the composition of various materials. Copies can be obtained without charge from the Industrial Advertising Division, Nopco Chemical Co., Harrison, N. J.

**Patterson Foundry & Machine Co.,** East Liverpool, O.—Illustrated and described in detail in a new 12-page bulletin released by this company, is their "Gyro-centric" screen for dry screening, separating, classifying, cleansing, reclaiming, and general dry process work, and for wet sifting or screening of liquids, dewatering operations, etc. Specification table is included, also a list of materials which can be screened with the machine. Write for Catalogue 477.

**Photovolt Corp.,** 95 Madison Avenue, New York 16, N. Y.—A folder descriptive of their new line-operated electronic pH meter has been issued by this company. Uses and applications for this instrument are listed, including the manufacture of pulp and paper. Ask for Bulletin 110.

**The Resinous Products & Chemical Co.,** W. Washington Square, Philadelphia 5, Pa.—Two booklets of importance to the paper maker have been gotten out by this company. One is "The Role of the Amberlites," which deals with the contributions made by Amberlites to the paper, chemical and other industries. The other, "The Uformites for Paper," is an informative booklet on synthetic resins in modern paper-making procedure. It discusses the history of wet strength in paper and its value in various applications. Specific data on preparation, operating conditions, dilution of resin and broke recovery with Uformite 467, 470 and 500 are covered in detail. Story-telling photos taken at the Savannah, Ga., plant are used to illustrate the booklet.

**Solvay Sales Corp.,** 40 Rector Street, New York 6, N. Y.—Now being offered to chemists and engineers responsible for water supply problems in industrial plants and water supply departments, is a Technical and Engineering Bulletin No. 8, "Alkalies and Chlorine in the Treatment of Municipal and Industrial Waters." In its 94 pages are sections on softening, purification, taste and odor removal, corrosion control, boiler feed water treatment, the use of alkalies, chlorine and other chemicals and equipment, also lists of standard reference books on subjects covered. It may be had without charge by writing to the above address.

**Warren Steam Pump Co.,** Warren, Mass.—A newly revised edition of their Bulletin 234 has been gotten out by this company, covering their Type SOD stock pumps for pulp and paper mills. Included in the folder is a composite dimension sheet showing pumps of this type with standard suction nozzles.

## BOOKS

**The Chemistry of Commercial Plastics**—This text is the work of Reginald L. Wakeman, Director of Research, Onyx Oil & Chemical Co.—also Advisory Fellow, Mellon Institute. It is a volume of 848 pages profusely illustrated with sketches, charts and photographs. Each chapter is concluded with a list of literature references. The book opens with an introductory chapter that explains the meaning of the word *plastics* and gives recognition to asphalt and pitch, natural resins, and shellac as natural products related to the plastics industry. It then proceeds to treat the following subjects: History of the Plastics Industry; Raw Materials of the Plastics Industry; General Chemical Principles of Resinification; Mechanical Manipulation of Plastics — Molding; Phenolic Plastics; Urea Plastics; Melamine Plastics; Aniline— Formaldehyde Resins; Aryl Sulfonamide—Formaldehyde Resins; Alkyds and Allied Resinous Esters; Polyamides — Nylon; Coumarone — Indene Resins, Miscellaneous Hydrocarbon Resins; Vinyl Resins; Polyvinylidene Chloride; Polystyrene; Polyvinyl Carbozole; Acrylic Resins; Contact Resins; Natural and Synthetic Elastomers; Rubber Derivatives; Cellulose Plastics; Lignin Plastics; Protein Plastics; Polymeric Organosilicon—Oxygen Compounds; and Miscellaneous Resins. One hundred pages are devoted to the two chapters covering cellulose and lignin plastics. The book concludes with individual indexes of trade names, authors, and subjects. Reinhold Publishing Corporation, 330 West 42nd St., New York, N. Y., is its publisher. Its price is $10.00 a copy.

**Coating and Ink Resins**—Written by Dr. William Krumbhaar, president, Krumbhaar Chemicals, Inc., this book is presented as a technological study of resin types now in common use and with which the author is in contact through development and production work. The subjects covered by the text, as indicated by chapter headings, include chemical fundamentals of coating and ink resins—the internal resin structure, views on molecular weights, the maturing process, reactivities between resins and oils; phenol resins—pure phenol resins, phenolic and alcoholic hydroxyl groups, rosin-modified phenolics; maleic resins—the polybasic acid components, the varieties of maleic resins; copal-type synthetics; chemical characteristics of resins; influence of resins on surface coatings—physical characteristics of coating resins, resin-oil combinations in coatings; influence of resins on printing inks—physical characteristics of ink resins, resin-oil combinations in inks; the application of resins—resin application in surface coatings, resin application in printing inks; machinery and equipment; the patent situation. Some of the illustrations of the text are reproduced in color. Closing with an extensive index, the volume totals more than 300 pages. Its publisher is Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y.; its price, $7.00 a copy.

**Compressed Air Handbook (First edition)**—This book totaling about 400 pages, is divided into five subjects, each covered in a separate chapter. Chapter I, entitled Typical Applications of Compressed Air and Gas, presents an account of some of the many uses of compressed air in every-day use. The types of machinery used for compressing air are treated in Chapter II, Representative Types of Compressor Installations. Air - Operated Portable Tools and Rock Drills is the subject of Chapter III. Suggestions and data on selection, installation, operation and care of compressed air plant are included in Chapter IV, entitled Engineering the Compressor Installation for Maximum Efficiency. Chapter V,

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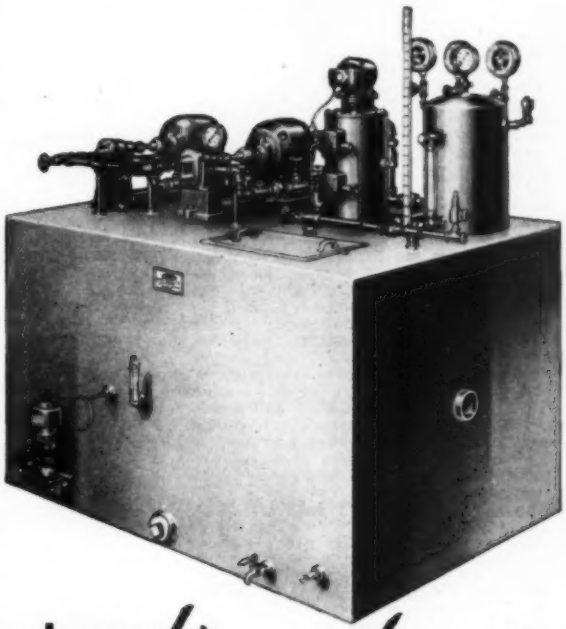

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Compressed Air Engineering Data and Test Procedure, contains engineering data and standards established by the Compressed Air and Gas Institute.

The book is priced at $3.00 a copy for purchase within the United States, $3.50 a copy elsewhere. The Compressed Air and Gas Institute, 90 West Street, New York 6, N. Y., is its publisher.

**Forest Products Research Guide in Fundamental and Applied Research** (Second Edition)—As expressed in the foreword, "the purpose of this publication is to summarize and classify, and to show: (1) the sources of reliable scientific knowledge and technical information resulting from fundamental and applied research in forest products by research agencies, including educational institutions, and firms; and (2) the further research needed to round out more completely the knowledge on wood needed for maximum wood products development." In all, 860 sources of data are cited. The agencies listed include 130 universities, 65 government bureaus, 100 producers, 300 consumers and processors of forest products, over 100 technical societies and private laboratories, and over 50 trade associations. About 70 foreign agencies are included in the total.

Various chapters deal with the structure and properties of wood, general processing on or with wood, such as seasoning, gluing, connector joining, and impregnation; chemical use, waste use, and plastics; lumber and timber products, such as poles, cross arms, and mine timbers; buildings, building parts, and other structures; fabricated products including aircraft, containers, and furniture; and means and devices for selection of qualities of wood. Another chapter lists reference books and pamphlets.

In all, 860 sources of data are cited. These agencies have done or have underway some 3,000 programs or projects.

Totaling 142 pages and itemizing some 460 types of fundamental and applied research, this publication (paper-covered) has been published by and may be procured from American Forest Products Industries, Inc., 1319 Eighteenth St., N. W., Washington 6, D. C. The price is $2.00 a copy.

**Injection Molding of Plastics**—Authored by Islyn Thomas, President, Thomas Manufacturing Corporation, this book presents a detailed, specific and practical coverage of the history, development, and mechanical problems involved in injection molding. The chapter headings follow: History, Development of Injection Molding Techniques, Materials for Injection Molding, Molding Practices, Product Design, Mold Design and Construction, Finishing and Decorating, and Estimating and Costs. Also included are two appendices—Appendix I being given over to definitions of physical properties; Appendix II, to general data.

The book, containing over 500 illustrations (including five color plates) and totaling nearly 550 pages, is priced at $10.00 by Reinhold Publishing Corporation, 330 W. 42nd St., New York. N. Y., its publisher.

**Legends of Paul Bunyan**—Compiled and edited by Harold W. Felton, this book presents a collection of more than 100 stories and legends of over thirty authors about Paul Bunyan. The stories and legends are brought together under the following group headings: The Spirit of Paul Bunyan Is in America; Paul, the Baby and the Boy; Paul the Man; The Wonderful Big Blue Ox, Babe; Food and the Kitchen; Paul's Fellow Workers, Pals and Friends; Paul's Adventures with Contemporary Heroes; Paul and the Animal Kingdom; Paul's Great Inventions; Paul's Vegetables; Paul Made Geography; Paul Had a Way with Water; Paul Made and Met the Weather; The Spirit of Paul Bunyan Will Stay in America. There also is an extensive bibliography, eight full-page color illustrations, and thirty-five black and white drawings. The illustrations are by Richard Bennett.

Totaling 439 pages (6⅝x9⅝ inches) and bound in cloth, the book is priced at $5.00 a copy net by its publisher, Alfred A. Knopf, Inc., 501 Madison Ave., New York 22, N. Y.

**Letter Symbols for Chemical Engineering**—This publication of 16 pages presents 163 letter symbols which are designed to provide the chemist and chemical engineer with an agreed group of letter symbols. The symbols cover only the field defined by the title and are not to be confused with those designating chemical elements or groups.

In addition to a section covering 83 such general concepts as acceleration, diffusity, entropy, molecular weight, surface tension, thermal conductivity and others, the publication has special sections dealing with terms relating to heat transmission, flow of fluids, evaporation, humidification, dehumidification, gas absorption and extraction, distillation, drying, sedimentation, filtration, screening and sampling, crystallization, centrifugation, and also various dimensionless numbers used by chemists.

Approved by the American Standards Association, and designated as American Standard Z10.12, the new standard was developed under a representative committee of which J. H. Perry, technical investigator, development department, E. I. du Pont de Nemours, was chairman. The price of the standard, available through the American Standards Association, 70 East 45th St., New York 17, N. Y., is 50 cents a copy.

**The Management Leader's Manual**—Edited by James O. Rice and M. J. Dooher, this manual has been designed for operating executives, supervisors and foremen. The twenty-two articles, which make up the text, were written by more than a score of management authorities. This material is arranged in seven sections, namely: Management Leadership in a Democracy; The Management Leader's Human Relations Responsibilities; Interviewing and Counseling Techniques; Toward Safe and Efficient Production; Progressive Training Techniques; Tests for the Management Leader; and Simplicity—The Key to Success.

Spiral bound in blue leatherette, the manual is priced at $3.00 a copy. American Management Association, 330 West 42nd St., New York 18, N. Y., is the publisher.

**Modern Packaging Encyclopedia (1948 edition)**—This book of more than 1200 pages contains about 670 pages of editorial material, 452 advertisers, and a buyers' guide of 90 pages. In the editorial preface, C. W. Browne, Editor-in-Chief, states that about one-fourth of the articles deal with subjects not included in any previous volume—another fourth, deal with familiar topics in entirely new treatments. All of the material is conveniently segregated into seven sections: namely, Introduction; The Changing Times; Planning Fundamentals; Materials; Package Forms; Production, Shipping, Display; Buyers' Guide and Directory.

There are twenty chapters in the book which portray a broad picture of packaging, package planning, market research, and statistics of packaging. The procedure of transforming materials into a finished package is illustrated. There is information by authorities in the field covering such subjects as changing market factors, changing consumer trends, population shifts, changing in buying habits, changes in outlets, store arrangements and display of merchandise.

There is new information on the hazards packages encounter, on metal cans, on tubes in packaging, on packaging for shipment, as well as on the merchandising phase of packaging. Information on the Lanham Trade Mark Act, contributed by Government authorities, also is included in the text.

Published by the Packaging Catalog Corporation, 122 East 42nd St., New York 17, N. Y., the book is priced at $6.50 a copy in the United States, $9.00 in Canada (including duty and postage), and $11.00 foreign.

**Paper Trade Terms . . .** A Glossary for the Allied Trades (Revised and Enlarged)—Compiled by William Bond Wheelwright, this work in library edition and limited to 500 copies on rag content paper, contains 735 definitions. Among these definitions are a number of new terms resulting from the adaptation of paper to wartime needs.

The author gratefully acknowledges the assistance of R. G. Macdonald, secretary-treasurer of the Technical Association of the Pulp and Paper Industry, in the work of revision.

Bound in stiff red cloth covers with title stamped in gold, the book is priced at $2.00 a copy. The Callaway Associates, 210 South St., Boston 11, Mass., is its publisher.

**Technological and Physical Investigations on Natural and Synthetic Rubbers**—One of a series of monographs on the progress of research in Holland during World War II, this book by A. J. Wildschut, research engineer of the Rubber Foundation (Delft, Holland), covers a survey of investigations in the field of rubber and rubber-like materials which were carried out in the Netherlands between the summer of 1939 and the summer of 1944. The work is divided into two major parts, namely: Technological Investigations and Physical Investigations. The chapters appearing in the section under Technological Investigations are: Standard Measurements, Miscellaneous Investigations and Modification by Means of the Vulcanization Process. In the section under Physical Investigations, the chapters are: Physical Methods in Structural Research, Measurements Concerning Plasticity and Elasticity of Vulcanized Rubbers, Mechanical Properties under Special Circumstances, X-Ray Investigations, Some Electrical Investigations, and General Conclusions.

Totaling about 175 pages, and paper-covered, the book is priced at $3.00 a copy. The publisher is the Elsevier Publishing Co., Inc., 215 Fourth Ave., New York 3, N. Y.

**Wood Pulp and Allied Products** (Second Edition)—Dr. Julius Grant is the author of this work as he was of the first edition which was titled Wood Pulp. The new title indicates the increased breadth of the text. In the main, however, the subject follows the same general lines of the first edition with attention being given to a number of the more recent developments.

The two opening chapters give fundamental technological and historical information. The text then proceeds to discuss cellulose and the wood fibre, the identification and evaluation of pulping woods, the preparation of wood for pulping, the mechanical or groundwood process (including semi-chemical), the chemical processes, the bleaching of wood pulp, the mechanical purification and de-watering of wood pulp, by-products from wood and wood pulping process, testing methods, and the uses of wood pulp. The presentation includes 38 illustrations. The book includes both an author and a subject index. Also each chapter closes with a list of reading references.

Totaling about 325 pages, and priced at 35s. 0d. a copy, the book has been published by Leonard Hill, Ltd., 17 Stratford Place, London, W. 1, England.

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# CURRENT MARKET QUOTATIONS

## RAGS (Domestic)

### NEW RAGS

**Quotations to consuming mills, cents per pound or dollars per hundred pounds, f.o.b. New York, follow:**

**(All Prices Are Nominal)**

| | per cwt. |
|---|---|
| Blue Overalls | 9.00 to 9.50 |
| Corduroy, Men's | 6.25 to 6.50 |
| Corduroy, Ladies' | 6.50 to 6.75 |
| Washables, No. 1 | 6.50 to 7.00 |
| Percales | 7.50 to 8.00 |
| Light Prints, No. 1 | 7.50 to 8.00 |
| **Khaki Cuttings—** | |
| Bleachable | 7.00 to 7.50 |
| Unbleachable | 6.50 to 7.00 |
| New White Canvas | 11.00 to 12.00 |
| New Mixed Blacks | 5.00 to 5.25 |
| Canton Flannels, Bleached | 11.00 to 11.50 |
| **Shirt Cuttings—** | |
| New White No. 1 | 12.50 to 13.00 |
| White Shrunk | 9.50 to 10.00 |
| Silesias No. 1 | 9.00 to 9.50 |
| New Unbleached | 13.00 to 13.50 |
| Fancy | 7.00 to 7.50 |
| **Linen Cuttings—** | |
| American | 8.50 to 9.00 |
| White | 14.50 to 15.50 |
| Grey | 13.50 to 14.50 |

## RAGS (Domestic)

### OLD RAGS

**Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:**

**(All Prices Are Nominal)**

| | per cwt. |
|---|---|
| **Roofing—** | |
| No. 1 | 1.85 to 1.90 |
| No. 2 | 1.75 to 1.80 |
| No. 3 and No. 4 | 1.55 to 1.65 |
| **Twos and Blues—** | |
| Repacked | 3.25 to 3.50 |
| **Thirds and Blues—** | |
| Repacked | 3.00 to 3.25 |
| Miscellaneous | 2.50 to 2.75 |
| **Whites, No. 1—** | |
| Repacked | 4.50 to 4.75 |
| Miscellaneous | 3.75 to 4.00 |
| **White, No. 2—** | |
| Repacked | 3.50 to 3.75 |
| Miscellaneous | 3.00 to 3.25 |

## RAGS (Foreign)

ex dock New York City

NEW RAGS

| | per cwt. |
|---|---|
| New Dark Cuttings | Nominal |
| New Mixed Cuttings | |
| New Light Silesias | |
| Light Flannelettes | |
| Unbleached Cuttings | |
| New White Cuttings | |
| New Light Oxfords | |
| New Light Prints | |

## RAGS (Foreign)

ex dock New York City

OLD RAGS

| | per cwt. |
|---|---|
| No. 1 White Linens | Nominal |
| No. 2 White Linens | |
| No. 3 White Linens | |
| No. 4 White Linens | |
| No. 1 White Cottons | |
| No. 2 White Cottons | |
| No. 3 White Cottons | |
| No. 4 White Cottons | |
| Extra Light Prints | |
| Ord. Light Prints | |
| Med. Light Prints | |
| Dutch Blue Cottons | |
| French Blue Cottons | |
| French Blue Linens | |
| Checks and Blues | |
| Linsey Garments | |
| Dark Cottons | |
| Old Shopperies | |

## ROPE and BAGGING

**f.o.b. and ex dock New York City**

**(All Prices Are Nominal)**

| | per cwt. |
|---|---|
| Gunny No. 1— | |
| Foreign | Nominal |
| Domestic | 6.75 to 7.00 |
| Wool Tares— | |
| Light | 6.50 to 6.75 |
| Heavy | 7.00 to 7.25 |
| No. 1 Scrap Bagging | 5.75 to 6.00 |
| Manila Rope— | |
| No. 1 large | 6.50 to 6.75 |
| No. 1 small | 5.50 to 5.75 |
| Sisal Rope— | |
| No. 1 large | 6.00 to 6.50 |
| No. 1 small | 5.50 to 6.00 |
| New Burlap Cuttings | 6.50 to 7.00 |
| Jute Threads— | |
| Foreign (Nom.) | 6.50 to 7.00 |
| Domestic | 6.00 to 6.50 |
| Strings— | |
| No. 1 sisal | 5.50 to 5.75 |
| No. 2 sisal | 5.00 to 5.25 |
| Soft jute | 4.50 to 4.75 |
| Mixed | 2.50 to 2.75 |

## WASTE PAPER

**The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:**

**(All Prices Are Nominal)**

| | per ton |
|---|---|
| **Shavings—** | |
| Hard White Env. Cuts | 150.00— |
| Hard White, No. 1 | 120.00— |
| Soft White, No. 1 | 100.00— |
| Soft White, One-cut | 120.00— |
| Soft White, Misc. | 90.00— |
| Fly Leaf, No. 1 | 55.00— |
| Fly Leaf, Woody, No. 1 | 45.00— |
| No. 2 Mixed Col. Woody | 35.00— |
| **Flat Stock—** | |
| No. 1 Heavy Books and Magazines | 27.50 to 30.00 |
| Mixed Books | 20.00 to 21.00 |
| **Ledger Stock—** | |
| No. 1 white | 90.00 to 95.00 |
| No. 1 Mixed (Colored) | 70.00 to 80.00 |
| **Manilas—** | |
| New Env. Cuttings | 130.00 to 140.00 |
| New Env. Cuts, One-Cut | — |
| Extra Manilas | — |
| Manila Tab Cards, Free of Ground Wood | 80.00 to 85.00 |
| Colored Manila Tab Cards | 65.00 to 70.00 |
| **Kraft—** | |
| New Envelope Cuttings | 115.00 to 120.00 |
| Tripled Sorted No. 1 100% | 70.00 to 75.00 |
| New 100% Cor. Cuts | 65.00 to 70.00 |
| No. 1 Old Assorted | 50.00 to 55.00 |
| **News—** | |
| White Blank | 70.00 to 75.00 |
| Overissue | 20.00 to 22.50 |
| No. 1 Baled | 16.00 to 17.00 |
| Old Corrugated Containers | 25.00 to 27.00 |
| New Corrugated Cuts | 35.00 to 37.00 |
| Mill Wrappers | 25.00 to 26.00 |
| Box Board Chips | 10.00 to 11.00 |
| No. 1 Mixed Paper | 12.00 to 13.00 |

## CHEMICALS

f.o.b. shipping point

**(All Prices Are Nominal)**

| | |
|---|---|
| **Alum (Papermakers)—** | |
| Lump, cwt. | 4.25— |
| Ground, cwt. | 4.00— |
| Powdered, cwt. | 4.40— |
| **Blanc Fixe—** | |
| Pulp, bulk, ton | $72.50— |
| Dry, barrels, pound | 82.50— |
| **Bleaching Powder—** | |
| Drums, cwt. | 3.00 to 3.50 |
| **Casein (Domestic Standard)** | |
| 20-30 mesh (bags), lb. | |
| 80-100 mesh (bags), lb. | 32.00 to 34.00 |
| Argentine, lb. | 31.00 to 32.00 |
| **China Clay—** | |
| Domestic Filler Bulk (mine) ton | 10.00 to 15.00 |
| Domestic Coating Bulk (mine) ton | 15.00 to 25.00 |
| Imported (chip side) Bulk (lump) ton | 22.00 to 30.00 |
| **Chlorine—** | |
| Tank cars (wks) cwt. | 2.25 to 2.50 |
| Gelatine (officin), lb. | 1.60 to 1.65 |
| Glyc. (C.P.) drums, lb. | .29¼— |
| Litharge, powd., bbl., lb. | .16½ to 17 |
| **Rosin (Gum)—** | |
| New York per 100 lbs. | |
| E | 9.25— |
| F | 9.25— |
| G | 10.15— |
| WW | 10.40— |
| Rosin (Wood), carlots | 6.25— |
| **Salt Cake—** | |
| Dom. bulk (wks) ton | 22.00 to 24.00 |
| Imp. bulks on dock— (All. ports) ton (Nom.) | 25.00 to —— |
| **Soda Ash—** | |
| Bulk (works), cwt. | 1.00 to 1.15 |
| Paper Bags, cwt. | 1.25 to 1.35 |
| Barrels, cwt. | 1.35 to 1.60 |
| **Soda (Caustic)—** | |
| Solid drums, cwt. | 2.85 to 3.00 |
| Ground and flake, drums, cwt. | 3.25 to 3.75 |
| **Sodium Silicate—** | |
| 60 deg., 55 gal. drums, (works) cwt. | 1.65 to 2.05 |
| 40 deg., 25 gal drums, (works), cwt. | .80 to 1.45 |
| **Starch—** | |
| Pearl, 140 lb. bags, cwt. | 6.52— |
| Pearl, barrels, cwt. | 6.52— |
| Paper (Sp.) bags, cwt. | 6.52— |
| Powdered, barrels, cwt. | 6.63— |
| **Sulphur (Crude)** (Mine) bulk, long ton | 16.00 to — |
| **Talc—** | |
| Dom. 100 lb. bags (mine) ton | 20.00 to 28.00 |
| Canadian | 35.00 to 45.00 |
| **Titanium Dioxide—** | |
| Barium Pig., bbls., lb. | .06½ to .07 |
| Calcium Pig., bbls., lb. | .06¼ to .06⅝ |
| Zinc Sulphide, bbls., lb. | 10.50 to 10.75 |

## WOOD PULP

Prices, dollars per short, air dry, ton, on dock American ports and f.o.b. shipping points with former OPA freight allowances, are:

**(All Prices Are Nominal)**

| | |
|---|---|
| Bleached sulphite, Swedish | 175.00 to 185.00 |
| Bleached sulphite, Finnish | 185.00— |
| Bleached sulphite, dom. | 120.00 to 125.00 |
| Easy bleaching sulphite | — |
| Unbleached sulphite, Swed. | 145.00 to 165.00 |
| Unbleached sulphite, Fin. | 155.00— |
| Unbleached sulphite, dom. | 115.00— |
| Unbleached kraft, Swedish | 140.00 to 155.00 |
| Unbleached kraft, Finnish | 147.50— |
| Unbleached kraft, northern | 112.50 to 125.00 |
| Unbleached kraft, southern | 90.00 to 120.00 |
| Bleached sulphate, Swedish | 175.00 to 185.00 |
| Bleached soda, domestic | 120.00 to 125.00 |
| Sulphite screenings, dom. | 55.00 to 65.00 |
| Sulphate screenings, dom. | 55.00 to 65.00 |
| Groundwood, domestic and Canadian | 75.00 to 80.00 |

## PAPER

**f.o.b. New York City**

**(All Prices Are Nominal)**

| | per ton |
|---|---|
| **Boards—** | |
| Binders | 94.00— |
| Chip | 90.00— |
| Chip, tube and can | 95.00— |
| Chip, full blending | 97.50— |
| Chip, sgl. mla. lined | 95.00— |
| Coated, white patent .018 | 120.00— |
| .020 and heavier | 110.00— |
| Kraft liner | 70.00— |
| Filled News | 90.00— |
| Container | 90.00— |

**Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:**

**(Per cwt. in ton lots)**

**Uncoated (Untrimmed)**

| | |
|---|---|
| **Book, White (M. F.)—** | |
| A Grade E. F. | 14.25— |
| B Grade E. F. | — |
| C Grade E. F. | — |
| D Grade E. F. | — |
| No. 2 Uncoated Offset 4 sides, White | — |
| **Machine Coated White (Trimmed 4 sides)** | |
| No. 1 Glossy | 19.55— |
| No. 2 Glossy | 18.30— |
| No. 3 Glossy | 17.00— |
| No. 4 Glossy | — |
| No. 2 Offset | 15.25— |
| C1S Litho (Varnish) | — |
| C1S Litho (Non-Varnish) | — |

**Writing Papers—f.o.b. mill with zone, quantity, packing and other differentials allowed:**

**Rag Content Bond—**

| (In Ton Lots) | per cwt. |
|---|---|
| Extra 100% Rag | 48.70— |
| 100% Rag | 42.70— |
| 75% Rag | 33.10— |
| 50% Rag | 27.50— |
| 25% Rag | 24.50— |

**Rag Content Ledger—**

| (In Ton Lots) | per cwt. |
|---|---|
| Extra 100% Rag | 48.00— |
| 100% Rag | 42.10— |
| 75% Rag | 33.10— |
| 50% Rag | 28.25— |
| 25% Rag | 25.10— |

**Sulphite Bond—**

| | per cwt. |
|---|---|
| Air dry, watermarked | — |
| No. 1 watermarked | 17.00— |
| No. 2 watermarked | 16.00— |
| No. 4 watermarked | 15.25— |

**Sulphite Ledger—**

| | per cwt. Zone 1 |
|---|---|
| No. 1 watermarked | 17.60— |
| No. 2 watermarked | 16.80— |
| No. 4 watermarked | 16.10— |

**Glassine (f.o.b. mill)—**

| | per cwt |
|---|---|
| Embossed (25 lbs. up) | — |
| Bleached (25 lb. up) | — |
| Unbleached (25 lb. up) | — |
| Greaseproof— Bleached (25 lb. up) | — |
| Unbleached (25 lb. up) | — |

**News—**

| | per ton |
|---|---|
| Rolls, Standard (Contract) | 90.00— |
| Rolls (Spot) | (Nominal) |
| Sheets | 100.00— |

**Tissues (Carlots)—**

| | per ream |
|---|---|
| White No. 1 | 1.70— |
| White No. 2 | 1.60— |
| Bleached Anti-Tarnish | — |
| Colored | — |
| Anti-Tarnish Kraft | 1.85— |
| Manilla | 1.50— |
| Napkins, semi-crepe (12½ lb. to M shts.) per cs. | .80— |
| Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs. | .80— |
| Toilet, Bleached (M shts.) per cs. | 7.00— |
| Toilet, Unbleached (M. shts.) per cs. | 6.40— |

**Towels—**

| | per case |
|---|---|
| Bleached | 4.75— |
| Unbleached | 4.00— |

**Wrappings (Kraft)—**

| | per cwt. |
|---|---|
| Super-Standard | 7.00 to 7.50 |
| No. 1 Wrapping | 6.50 to 7.00 |
| Standard Wrapping | 6.25 to 6.75 |
| Standard Bag | 6.25 to 6.75 |
| Variety Bag | — |

**Wrappings (Sulphite and Bleached Kraft)— (Rolls, f.o.b. mill)**

**Bleached Papers—**

| | per cwt. |
|---|---|
| M.F. & M.G. Waxing, 20 lb. (Carloads only (10,000 lbs.) | — |
| Drug wrapp., 35 lb. | — |
| **Unbleached Papers—** | |
| Com. Gr. Butch. 40 lb. | — |
| No. 1 Butchers | — |
| No. 1 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb. | — |
| No. 2 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb. | — |
| Steam Finish, 50 lb. | — |
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| **Manilas—** | |
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| Envy. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.) | |
| **Wrapp. Mla. 35 lb. up—** | |
| No. 1 | — |
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| **M.G. Sulphite and Kraft (other than Waxing)** | |
| Grade B20 lb. | — |
| Grade A-22 lb. | — |

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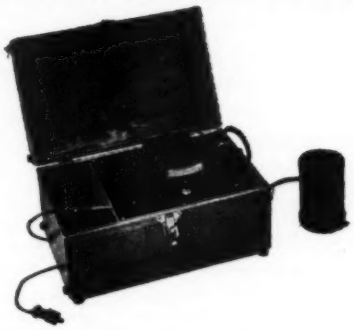

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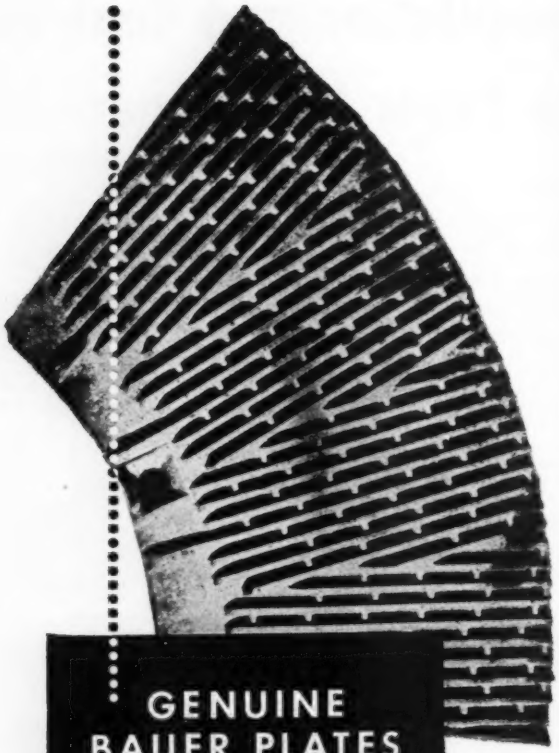

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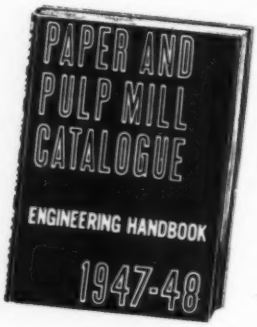


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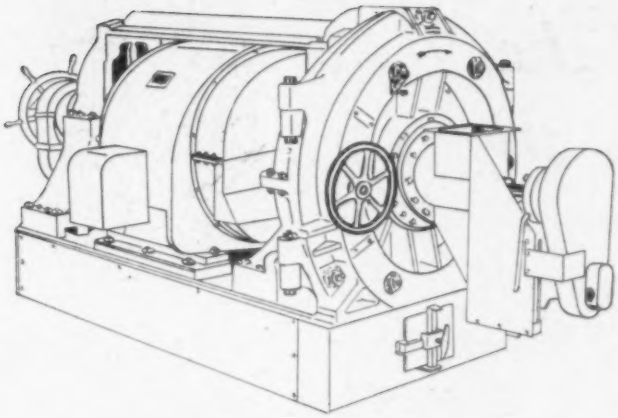
# Brown stock refining in hot liquor . . .



Sprout-Waldron Refiners placed between the blow tanks and the washers save wood and chemicals, and permit improved evaporation.

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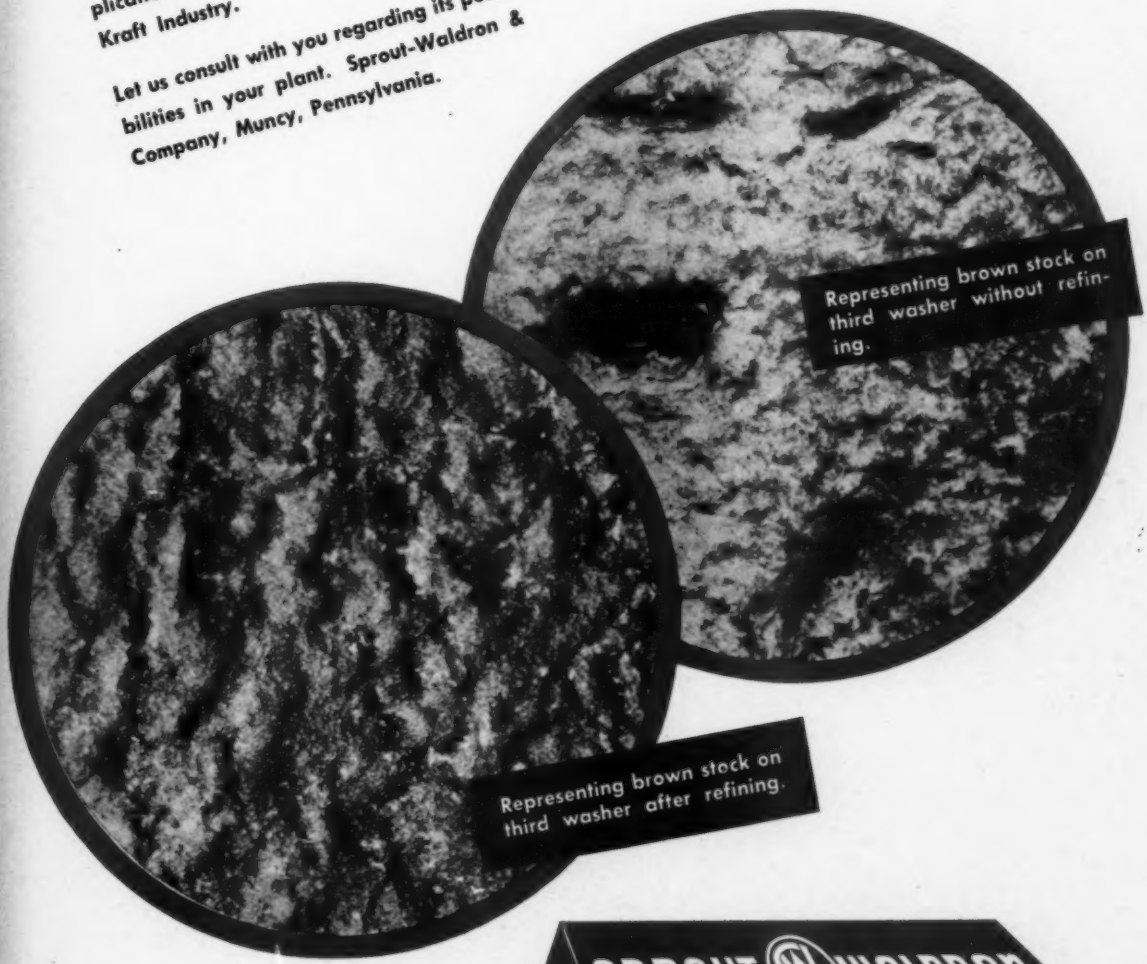
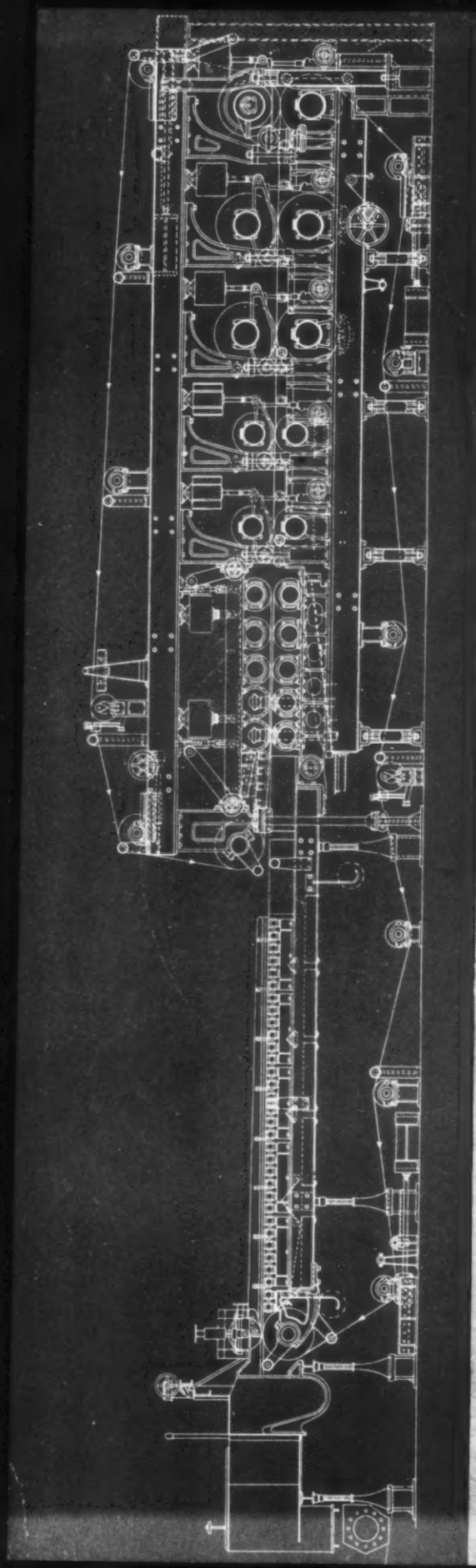
Let us consult with you regarding its possibilities in your plant. Sprout-Waldron & Company, Muncy, Pennsylvania.



Representing brown stock on third washer without refining.

Representing brown stock on third washer after refining.

SPROUT WALDRON
Manufacturing Engineers



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